PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF THE RECORDING OF A CHANGE

(PCT Rule 92bis.1 and Administrative Instructions, Section 422)

To:

SUZUYE, Takehiko
Suzuye & Suzuye
7-2, Kasumigaseki 3-chome
Chiyoda-ku, Tokyo 100-0013
JAPON

Date of mailing (day/month/year) 16 août 2001 (16.08.01)	
Applicant's or agent's file reference 99S1109P	**IMPORTANT NOTIFICATION**
International application No. PCT/JP00/01354	**International filing date** (day/month/year) 06 mars 2000 (06.03.00)

1. The following indications appeared on record concerning:

[X] the applicant [ ] the inventor [ ] the agent [ ] the common representative

Name and Address	State of Nationality	State of Residence
KABUSHIKI KAISHA TOSHIBA 72, Horikawa-cho Saiwai-ku, Kawasaki-shi, Kanagawa 210-8572 Japan	JP	JP
	Telephone No. 03-3457-2512	
	Facsimile No. 03-3456-3229	
	Teleprinter No.	

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

[ ] the person [ ] the name [X] the address [ ] the nationality [ ] the residence

Name and Address	State of Nationality	State of Residence
KABUSHIKI KAISHA TOSHIBA 1-1, Shibaura 1-chome Minato-ku, Tokyo 105-8001 Japan	JP	JP
	Telephone No.	
	Facsimile No.	
	Teleprinter No.	

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

[X] the receiving Office
[ ] the International Searching Authority
[ ] the International Preliminary Examining Authority
[ ] the designated Offices concerned
[X] the elected Offices concerned
[ ] other:

The International Bureau of WIPO **34, chemin des Colombettes** **1211 Geneva 20, Switzerland**	Authorized officer Yukari NAKAMURA
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Commissioner
US Department of Commerce
United States Patent and Trademark Office, PCT
2011 South Clark Place Room 524
Arlington, VA 22202
ETATS-UNIS D'AMERIQUE
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 26 October 2000 (26.10.00)	
International application No. PCT/JP00/01354	**Applicant's or agent's file reference** 99S1109P
International filing date (day/month/year) 06 March 2000 (06.03.00)	**Priority date** (day/month/year) 05 March 1999 (05.03.99)
Applicant NAGAI, Takeshi et al	

1. The designated Office is hereby notified of its election made:

   [X] in the demand filed with the International Preliminary Examining Authority on:

   17 August 2000 (17.08.00)

   [ ] in a notice effecting later election filed with the International Bureau on:

   _____

2. The election [X] was

   [ ] was not

   made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO **34, chemin des Colombettes** **1211 Geneva 20, Switzerland**	Authorized officer Antonia Muller
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION CONCERNING SUBMISSION OR TRANSMITTAL OF PRIORITY DOCUMENT

(PCT Administrative Instructions, Section 411)

To:

SUZUYE, Takehiko
Suzuye & Suzuye
7-2, Kasumigaseki 3-chome
Chiyoda-ku, Tokyo 100-0013
JAPON

Date of mailing (day/month/year) 07 April 2000 (07.04.00)	
Applicant's or agent's file reference 99S1109P	**IMPORTANT NOTIFICATION**
International application No. PCT/JP00/01354	International filing date (day/month/year) 06 March 2000 (06.03.00)
International publication date (day/month/year) Not yet published	Priority date (day/month/year) 05 March 1999 (05.03.99)
Applicant KABUSHIKI KAISHA TOSHIBA et al	

1. The applicant is hereby notified of the date of receipt (except where the letters "NR" appear in the right-hand column) by the International Bureau of the priority document(s) relating to the earlier application(s) indicated below. Unless otherwise indicated by an asterisk appearing next to a date of receipt, or by the letters "NR", in the right-hand column, the priority document concerned was submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b).

2. This updates and replaces any previously issued notification concerning submission or transmittal of priority documents.

3. An **asterisk(*)** appearing next to a date of receipt, in the right-hand column, denotes a priority document submitted or transmitted to the International Bureau but not in compliance with Rule 17.1(a) or (b). In such a case, **the attention of the applicant is directed** to Rule 17.1(c) which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.

4. The **letters "NR"** appearing in the right-hand column denote a priority document which was not received by the International Bureau or which the applicant did not request the receiving Office to prepare and transmit to the International Bureau, as provided by Rule 17.1(a) or (b), respectively. In such a case, **the attention of the applicant is directed** to Rule 17.1(c) which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.

Priority date	Priority application No.	Country or regional Office or PCT receiving Office	Date of receipt of priority document
05 Marc 1999 (05.03.99)	11/58590	JP	31 Marc 2000 (31.03.00)

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. (41-22) 740.14.35

Authorized officer

Carlos Naranjo

Telephone No. (41-22) 338.83.38

PATENT COOPERATION TREATY

PCT

From the INTERNATIONAL BUREAU

To:
SUZUYE, Takehiko
Suzuye & Suzuye
7-2, Kasumigaseki 3-chome
Chiyoda-ku, Tokyo 100-0013
JAPON

NOTICE INFORMING THE APPLICANT OF THE COMMUNICATION OF THE INTERNATIONAL APPLICATION TO THE DESIGNATED OFFICES

(PCT Rule 47.1(c), first sentence)

Date of mailing (day/month/year) 14 September 2000 (14.09.00)	
Applicant's or agent's file reference 99S1109P	**IMPORTANT NOTICE**

International application No.	**International filing date** (day/month/year)	**Priority date** (day/month/year)
PCT/JP00/01354	06 March 2000 (06.03.00)	05 March 1999 (05.03.99)

Applicant
KABUSHIKI KAISHA TOSHIBA et al

1. Notice is hereby given that the International Bureau has communicated, as provided in Article 20, the international application to the following designated Offices on the date indicated above as the date of mailing of this Notice:
   AU,KR,US

   In accordance with Rule 47.1(c), third sentence, those Offices will accept the present Notice as conclusive evidence that the communication of the international application has duly taken place on the date of mailing indicated above and no copy of the international application is required to be furnished by the applicant to the designated Office(s).

2. The following designated Offices have waived the requirement for such a communication at this time:
   BR,CA,CN,EP,MX,NO,SG,VN

   The communication will be made to those Offices only upon their request. Furthermore, those Offices do not require the applicant to furnish a copy of the international application (Rule 49.1(a-bis)).

3. Enclosed with this Notice is a copy of the international application as published by the International Bureau on
   14 September 2000 (14.09.00) under No. WO 00/54512

REMINDER REGARDING CHAPTER II (Article 31(2)(a) and Rule 54.2)

If the applicant wishes to postpone entry into the national phase until 30 months (or later in some Offices) from the priority date, **a demand for international preliminary examination** must be filed with the competent International Preliminary Examining Authority before the expiration of 19 months from the priority date.

It is the applicant's sole responsibility to monitor the 19-month time limit.

Note that only an applicant who is a national or resident of a PCT Contracting State which is bound by Chapter II has the right to file a demand for international preliminary examination.

REMINDER REGARDING ENTRY INTO THE NATIONAL PHASE (Article 22 or 39(1))

If the applicant wishes to proceed with the international application in the **national phase**, he must, within 20 months or 30 months, or later in some Offices, perform the acts referred to therein before each designated or elected Office.

For further important information on the time limits and acts to be performed for entering the national phase, see the Annex to Form PCT/IB/301 (Notification of Receipt of Record Copy) and Volume II of the PCT Applicant's Guide.

The International Bureau of WIPO **34, chemin des Colombettes** **1211 Geneva 20, Switzerland**	Authorized officer J. Zahra
Facsimile No. (41-22) 740.14.35	Telephone No. (41-22) 338.83.38

Form PCT/IB/308 (July 1996) 3512011

DOCKET NO.: 213591US2SRDPCT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE APPLICATION OF: Takeshi NAGAI, et al.
SERIAL NO.: NEW U.S. PCT APPLICATION
FILED: HEREWITH
INTERNATIONAL APPLICATION NO.: PCT/JP00/01354
INTERNATIONAL FILING DATE: March 6, 2000
FOR: VIDEO CODING APPARATUS AND VIDEO DECODING APPARATUS

REQUEST FOR CONSIDERATION OF DOCUMENTS CITED IN INTERNATIONAL SEARCH REPORT

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

In the matter of the above-identified application for patent, notice is hereby given that applicant(s) request that the Examiner consider the documents cited in the International Search Report according to MPEP §609 and so indicate by a statement in the first Office Action that the information has been considered. When the Form PCT/DO/EO/903 indicates both the search report and copies of the documents are present in the national stage file, there is no requirement for the applicant(s) to submit them (1156 O.G. 91 November 23, 1993).

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.

Marvin J. Spivak
Attorney of Record
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THE FOLLOWING IS THE ENGLISH TRANSLATION OF THE AMENDMENTS TO THE CLAIMS OF THE INTERNATIONAL APPLICATION UNDER PCT ARTICLE 19: AMENDED SHEETS (Pages 68-81/2).

C L A I M S

1. (Amended) A video coding apparatus comprising:

a coder section for generating coded information obtained by arbitrary shape coding an input video picture as a bit stream;

an important information constructing section for extracting, from the coded information obtained by said coder section, important information representing a rule of coding a set of predetermined bit streams, and constructing the important information;

a sync signal generator section for generating a sync signal; and

a bit stream reconstructing section for adding the sync signal output from said sync signal generator means, an HEC code representing whether or not the important information is duplexed and the important information constructed by said important information constructing section to the bit stream coded by said coder section, to reconstruct the bit stream.

2. (Amended) The video coding apparatus according to claim 1, wherein said important information constructing section comprises:

a first important information constructing section for constructing, from the coded information, conventional picture relating information as important information in a conventional coding scheme of coding a frame in units of rectangular regions;

a second important information constructing

section for constructing, from the coded information, arbitrary shape picture relating important information as important information in an arbitrary shape coding scheme of coding a picture in the frame in units of arbitrary shape picture regions;

an arbitrary shape coding determination section for determining based on the coded information whether the coded picture is an arbitrary shape picture;

a switch section for outputting the arbitrary shape picture relating important information when said arbitrary shape coding determination section determines that the coded picture is an arbitrary shape picture; and

a multiplexer section for multiplexing the conventional picture relating information and an output from said switch section.

3. The video coding apparatus according to claim 2, wherein said arbitrary shape coding determination section determines whether the coded picture is a rectangular picture or an arbitrary shape picture to output a determination signal and controls said switch section in accordance with the determination signal.

4. The video coding apparatus according to claim 1, wherein said bit stream reconstructing section duplexes the important information in a predetermined format and insert the duplexed important information

into a header.

5. The video coding apparatus according to claim 1, wherein said bit stream reconstructing section comprises a macroblock boundary determination section for determining whether or not the coded bit stream is positioned on a macroblock boundary, a counter for counting bits of the coded bit stream, a sync signal inserting determination section for outputting an insertion permission signal when the macroblock boundary determination section determines the macroblock boundary for the bit stream and a count value of the bits of the bit stream exceeds a given value, a header information inserting section for forming expansion header information from the important information and the sync signal and adding the expansion information to the coded bit stream in response to the insertion permission signal from said sync signal inserting determination section.

6. The video coding apparatus according to claim 5, wherein the expansion header information is provided in a video packet starting at the sync signal.

7. (Amended) A video decoding apparatus comprising:

a bit stream receiving section for receiving a bit stream including coded video information that is obtained by arbitrary shape coding a video picture, sync information and header information including

important information representing a rule of coding a set of predetermined

bit streams;

a demultiplexer section for demultiplexing the coded bit stream into a picture bit stream corresponding to the video information;

a decoder section for decoding the picture bit stream;

a sync signal detector section for detecting a sync signal from the bit stream, and informing said decoder section of the sync signal;

an error check section for checking presence of an error on the basis of decoded information of said decoder section; and

an important information constructing section for constructing important information from the header information output from said decoder section, and informing said decoder section of the important information when said error check section determines absence of an error.

8. (Amended) The video decoding apparatus according to claim 7, wherein said important information constructing section comprises:

a first important information constructing section for constructing conventional picture relating important information from the header information;

an arbitrary shape coding determination means for determining based on the header information whether a

picture decoded from the header information is an arbitrary shape picture;

a second important information constructing means for constructing arbitrary shape picture relating important information from the header information;

a first switch section for inputting the header information to said second important information constructing section when said arbitrary shape coding determination section determines that the decoded picture is an arbitrary shape picture; and

a second switch section for outputting the arbitrary shape picture relating important information when said arbitrary shape coding determination section determines that the decoded picture is an arbitrary shape picture.

9. (Amended) The video decoding apparatus according to claim 7, wherein said important information constructing section outputs VOP (video object plane)header information when a VOP header is included in the bit stream obtained during decoding of said decoder section, and outputs the important information of the VOP when no VOP header is included in the bit stream obtained during decoding of said decoder section.

10. (Amended) The video decoding apparatus according to claim 9, wherein said important information constructing section decodes the conventional picture

relating important information when the VOP header is found from the bit stream in said decoder section.

11. The video decoding apparatus according to claim 7, wherein said decoder section executes a decoding operation from a position of a next sync signal detected by said sync signal detector section after performing a processing corresponding to an error when said error check section detects the error.

12. (Amended) A video coding apparatus comprising:

a coder section for generating coded information obtained by arbitrary shape coding an input video picture as a bit stream;

an important information constructing section for extracting, from the coded information obtained by said coder section, important information representing a rule of coding a set of predetermined bit streams, and constructing the important information;

a bit stream divider section for dividing the bit stream coded by said coder section into a plurality of divided bit strings;

a packet header generator section for generating a packet header from the important information constructed by said important information constructing section; and

a packet constructing section for constructing a packet using the divided bit strings and the packet header.

13. (Amended) The video coding apparatus according to claim 12, wherein said important information constructing section comprises:

an arbitrary shape picture relating important information constructing section for constructing arbitrary shape picture relating important information from the coded information;

an expansion header insertion determining section for determining based on the coded information whether an expansion header holding the arbitrary shape picture relating important information is to be inserted in the packet header; and

a switch section for inputting the header information to the arbitrary shape picture relating important information when said expansion header insertion determining section determines that the expansion header is to be inserted.

14. The video coding apparatus according to claim 12, wherein said packet header generator section outputs the packet header containing the important information therein to said packet constructing section, and said bit stream divider section divides the bit stream output from said coder section in a packet size and outputs it.

15. (Amended) A video decoding apparatus comprising:

a bit stream receiving section for receiving a bit stream including coded video information obtained by

arbitrary shape coding a video picture, sync information, and packet header information including important information representing a rule of coding a set of predetermined bit streams when the video picture is coded;

a demultiplexer section for demultiplexing the bit stream into a picture bit string of the video picture information and packet header information;

a decoder section for decoding the picture bit string;

an error check section for checking presence of an error on the basis of decoded information of said decoder section; and

an important information constructing section for extracting and constructing the important information from the packet header information, and informing said decoder section of the constructed important information, when said error check section determines presence of an error and the important information is required in decoding.

16. (Amended) The video coding apparatus according to claim 15, wherein said important information constructing section comprises:

a first important information constructing section for constructing arbitrary shape picture relating important information from the packet header information;

an expansion header insertion determining section

for determining based on the packet header information whether an expansion header is inserted in the packet header; and

a switch section for inserting the packet header information to the arbitrary shape picture relating important information when said expansion header insertion determining section determines that the expansion header is inserted.

17. (Amended) A video transmission system comprising:

a server computer including a video coding apparatus for arbitrary shape coding a video to generate a coded bit stream;

a transmitter for transmitting the coded bit stream of said server computer;

a receiver for receiving the coded bit stream from said server computer; and

a client computer including a video decoding apparatus for decoding the coded bit stream from said receiver, and wherein

said video coding apparatus comprises:

a coder section for generating coded information obtained by coding an input video picture as a bit stream;

an important information constructing section for extracting, from the coded information obtained by said coder section, important information representing a

rule of coding a set of predetermined bit streams,

and constructing the important information;

a sync signal generator section for generating a sync signal; and

a bit stream reconstructing section for adding the sync signal output from said sync signal generator means, an HEC code representing whether or not the important information is duplexed and the important information constructed by said important information constructing section to the bit stream coded by said coder section, to reconstruct the bit stream, and

said video decoding apparatus comprises:

a demultiplexer section for demultiplexing the received coded bit stream into a picture bit stream corresponding to the video information;

a decoder section for decoding the picture bit stream;

a sync signal detector section for detecting a sync signal from the bit stream, and informing said decoder section of the sync signal;

an error check section for checking presence of an error on the basis of decoded information of said decoder section; and

an important information constructing section for constructing important information from the header information output from said decoder section, and informing said decoder section of the important information when said error check section determines

absence of an error.

18. (Amended) A video transmission system comprising:

a server computer including a video coding apparatus for arbitrary shape coding a video to generate a coded bit stream;

a transmitter for transmitting the coded bit stream of said server computer;

a receiver for receiving the coded bit stream from said server computer; and

a client computer including a video decoding apparatus for decoding the coded bit stream from said receiver, and wherein

said video coding apparatus comprises:

a coder section for generating coded information obtained by arbitrary shape coding an input video picture as a bit stream;

an important information constructing section for extracting, from the coded information obtained by said coder section, important information representing a rule of coding a set of predetermined bit streams, and constructing the important information;

a bit stream divider section for dividing the bit stream coded by said coder section into a plurality of divided bit strings;

a packet header generator section for generating a packet header from the important information constructed by said important information constructing section; and

a packet constructing section for constructing a packet using the divided bit strings and the packet header, and

said video decoding apparatus comprises:

a demultiplexer section for demultiplexing the received bit stream into a picture bit string of the video picture information and packet header information;

a decoder section for decoding the picture bit string;

an error check section for checking presence of an error on the basis of decoded information of said decoder section; and

an important information constructing section for extracting and constructing the important information from the packet header information, and informing said decoder section of the constructed important information, when said error check section determines presence of an error and the important information is required in decoding.

19. (Amended) A recording medium storing:

a header including information that is used in common to coded data; and

a VOP including: a first video packet that comprises a VOP header and macrobook data; and at least one second video packet that comprises a VP header and macrobook data is a shape information header storing

arbitrary information of a picture to be recorded,

said VP header including a sync signal, and an HEC code representing whether or not the important information is duplexed, the important information indicating a rule according to which coded information obtained by arbitrary shape coding is coded.

20. The recording medium according to claim 19, wherein the important information of the VP header includes information about a width of a picture, information about a height of the picture, information about x-and y coordinates at which the picture is pasted, a flag representing whether coding is done after the shape information is scaled-down, and information about a coding type of the shape information.

21. (Amended) A video decoding apparatus comprising:

demultiplexer means for demultiplexing an input bit stream into a picture stream;

decoder means for decoding the picture bit stream;

sync signal detector means for detecting a sync signal from the picture bit stream, and informing said decoder means of the sync signal; and

important information constructing means for constructing important information from header information output from said decoder means, and informing said decoder means of the important

information.

22. (Amended) A video coding apparatus according to claim 21, further comprising:

means for constructing conventional picture relating important information from the header

information;

arbitrary shape coding determination means for determining based on the header information whether a decoded picture is an arbitrary shape picture;

arbitrary shape picture relating important information constructing means for constructing arbitrary shape picture relating important information from the header information;

switch means for inputting the header information to said arbitrary shape picture relating information constructing means when said arbitrary shape coding determination means determines that the decoded picture is an arbitrary shape picture; and

switch means for outputting the arbitrary shape picture relating important information when said arbitrary shape coding determination means determines that the decoded picture is an arbitrary shape picture.

23. (New) A video coding apparatus according to claim 1, characterized in that said important information includes information representing an image size and an image position.

24. (New) A video coding apparatus according to claim 7, characterized in that said important information includes information representing an image size and an image position.

25. (New) A video coding apparatus according to claim 12, characterized in that said important information includes information representing an image size and an image position.

26. (New) A video coding apparatus according to claim 15, characterized in that said important information includes information representing an image size and an image position.

27. (New) A video coding apparatus according to claim 17, characterized in that said important information includes information representing an image size and an image position.

28. (New) A video coding apparatus according to claim 18, characterized in that said important information includes information representing an image size and an image position.

29. (New) A video coding apparatus according to claim 19, characterized in that said VP header includes an HEC code representing that the important information

is duplexed, and important information relating to duplexed arbitrary shaped codes.

NOTIFICATION FOR FILING OPINION

Applicant: KABUSHIKI KAISHA TOSHIBA

Application No.: Patent Application No. 2001-7011312

Title of Invention: Moving Picture Encoding Apparatus and Moving Picture Decoding Apparatus

As the result of examination of the present application, the following reasons for rejection have been found and notified herein on the basis of the provision of Section 63 of the Patent Law. Any opinion about the rejection [Form 25-2 attached to the Regulations under the Patent Law], and/or any amendment [Form 5 attached to the Regulations under the Patent Law] must be filed by August 24, 2004. (The above date is extensible by one month for each request. No notification of allowance of extension of time will be issued.)

[Reason]

The inventions recited in claims 1, 2, 4, 7-9, 11, 17, 21-24, 27, 28, 30-32, and 34-47 are unpatentable under Section 29 (2) of the Patent Law, as being such that the invention could easily have been made by a person with ordinary skill in the art to which the invention pertains, on the basis of the invention described in the following publication distributed prior to this application

[Remarks]

Claims 1, 2, 4, 23, 30 and 35-38 claim a moving picture encoding apparatus (method) comprising an encoding section (step), an important information constructing section (step), a sync signal generating section (step), and a bit string constructing section (step). Claims 7, 8, 9, 11, 24, 31 and 39-42 claim a moving picture decoding apparatus (method) comprising a bit string receiving section (step), a separating section (step), a decoding section (step), a sync signal detecting section (step) and an important information constructing section (step). Claims 17, 27 and 32 claim a moving picture transmission system comprising a server computer including a moving picture encoding apparatus, a transmitter, a receiver and a client computer including a moving

picture decoding apparatus. Claims 43-45 claim a moving picture transmission method comprising a moving picture encoding step in a server computer, a transmitting step, a receiving step and a moving picture decoding step in a client computer. Claims 21, 22, 28, 34, 46 and 47 claim a moving picture decoding apparatus (method) comprising separating means (step), decoding means (step), sync signal detecting means (step) and important information constructing means (step). Addition of important information and a sync signal to an image signal bit string in an encoding and decoding apparatus (method) is the same as the addition of important information and a sync signal to an image signal bit string described in "World of MPEG-4", edited by S. Miki, published by Kogyo Chosakai in Japan on September 30, 1998 (hereinafter referred to as "Cited Invention 1", a Korean translation thereof "World of MPEG-4" translated by Kou Sonze and Kim Zonoku, published by Daieisha is attached). The technique of transmitting important data in duplicate and the use of a header diffusion code as information relating thereto is the same as the use of a header diffusion code of the error restoration tools in MPEG-4 described in Tallui, "Error resilient video coding in the ISO MPEG-4 standard", IEEE Comm. Magazine, June 1998, pp 112-119 (hereinafter referred to as "Cited Invention 2"). It is merely well-known and commonly-used art in this field of art to transmit and receive coded information and exchange information on the position and size of an image by moving picture encoding between server and client computers. The size, position and mode flag, etc. recited in claims 30-34, 38, 42, 45 and 47 are nothing more than those used in the MPEG-4 standard, as described in the detailed description of the invention.

Therefore, claims 1, 2, 4, 7-9, 11, 17, 21-24, 27, 28, 30-32, and 34-47 are obtained by simply combining Cited Invention 1, Cited Invention 2, the

MPEG-4 standard and the well-known and commonly-used art as described above. It is not particularly difficult to combine them. It is not considered that a new advanced effect can be obtained by the combination. Consequently, the present invention could have been easily achieved on the basis of Cited Invention 1, Cited Invention 2, the MPEG-4 standard and the well-known and commonly-used art (Section 29 (2) of the Patent Law).

[Attachment]

Attachment 1. A copy of Tallui, "Error resilient video coding in the ISO MPEG-4 standard" IEEE Comm. Magazine, June 1998, pp 112-119

June 24, 2004

Korean Patent Office

출력 일자: 2004/6/25

발송번호 : 9-5-2004-024614782
발송일자 : 2004.06.24
제출기일 : 2004.08.24

수신 : 서울 마포구 도화2동 37번지 진도빌딩 12층
김명신 귀하

121-732

특허청
의견제출통지서

출원인 명칭 가부시끼가이샤 도시바 (출원인코드: 519980849672)
주소 일본국 도꾜도 미나또꾸 시바우라 1쪼메 1방 1고

대리인 성명 김명신
주소 서울 마포구 도화2동 37번지 진도빌딩 12층

출원번호 10-2001-7011312

발명의 명칭 동화상 부호화 장치 및 동화상 복호화 장치

이 출원에 대한 심사결과 아래와 같은 거절이유가 있어 특허법 제63조의 규정에 의하여 이를 통지하오니 의견이 있거나 보정이 필요할 경우에는 상기 제출기일까지 의견서[특허법시행규칙 별지 제25호의2서식] 또는/및 보정서[특허법시행규칙 별지 제5호서식]를 제출하여 주시기 바랍니다.(상기 제출기일에 대하여 매회 1월 단위로 연장을 신청할 수 있으며, 이 신청에 대하여 별도의 기간연장승인통지는 하지 않습니다.)

[이 유]

이 출원의 특허청구범위 제제 1항, 제2항, 제4항, 제7항 내지 제9항, 제11항,제 17항, 제 21항 내지 제24항 및 제27항, 제28항, 제30항 내지 제32항, 제34항 내지 제47항에 기재된 발명은 그 출원전에 이 발명이 속하는 기술분야에서 통상의 지식을 가진 자가 아래에 지적한 것에 의하여 용이하게 발명할 수 있는 것이므로 특허법 제29조제2항의 규정에 의하여 특허를 받을 수 없습니다.

[아래]

본원발명의 청구항 제1항, 제2항, 제4항, 제23항, 제30항,제35항 내지 제38항은 부호화부(단계), 중요정보 구성부(단계), 동기신호발생부(단계), 비트열구성부(단계)를 구비하는 것을 특징으로 하는 동화상 부호화장치(방법), 청구항 제7항, 제8항, 제9항, 제11항, 제24항, 제31항, 제39항 내지 제42항은 비트열수신부(단계), 분리부(단계), 복호화부(단계), 동기신호검출부(단계), 중요정보구성부(단계)를 구비하는 것을 특징으로 하는 동화상 복호화장치(방법), 청구항 제17항, 제27항, 제32항은 동화상 부호화장치를 포함하는 서버컴퓨터, 송신기, 수신기, 동화상복호화장치를 포함하는 클라이언트 컴퓨터로 구성되는 것을 특징으로 하는 동화상 전송시스템, 청구항 제43항 내지 45항은 서버컴퓨터에서의 동화상 부호화단계, 송신단계, 수신단계, 클라이언트 컴퓨터를 포함하는 동화상복호화 단계로 구성되는 것을 특징으로 하는 동화상 전송방법, 청구항 제21항, 제22항, 제28항, 제34항,제46항 및 제47항은 분리수단(단계), 복호화수단(단계), 동기신호검출수단(단계), 중요정보구성수단(단계)을 구비하는 것을 특징으로 하는 동화상복호화장치(방법)를 청구하고 있으나 부호화 및 복호화 장치(방법)에서 화상신호 비트열에 중요정보, 동기신호를 부가하는 것은 일본에서 1998년9월30일 발행된 미키 스케이치 편저 공업조사회 발행의 "MPEG-4의 세계"(이하 인용발명1 이라함, 이를 번역한 고성제,김종옥 공역 대영사 발행 "MPEG-4의 세계" 를 첨부함)에서 화상신호 비트열에 중요정보, 동기신호를 부가하는 것과 동일하며, 중요한 데이터를 이중화하여 전송하는 기술 및 이에 대한 정보로 헤더확산코드를 사용하는 것은 Tallui,"Error resilient video coding in the ISO MPEG-4 standard", IEEE Comm. Magazine, June 1998, pp112-119 (인용발명 2이라 함)에서 소개하고 있는 MPEG-4에서의 에러복원 도구들 중 헤더확산코드이 사용과 동일합니다. 또한 서버와 클라이언트 컴퓨터 간에 부호화된 정보를 송수신하는 것과 동화상 부호화에서 화상의 위치와 크기에 대한 정보를 주고 받는 것은 이 기술분야에서 주지관용기술에 불과하며, 청구항 제30항 내지 34항, 제38항, 제42항, 제45항, 제47항에 기재되어 있는 화상크기, 위치 및 모드플랙들은 상세한 설명에 기재되어 있는 것과 같이 MPEG-4표준에서 사용하는 것에 불과합니다.

출력 일자: 2004/6/25

따라서 본원발명 제 1항, 제2항, 제4항, 제7항 내지 제9항, 제11항, 제17항, 제 21항 내지 제24항 및 제27항, 제28항, 제30항 내지 제32항, 제34항 내지 제47항은 상기 인용발명1 과 인용발명2, MPEG-4표준 및 주지관용기술을 단순결합한 것이라 할 수 있으며 이를 결합하는 데 각별한 곤란성이 있다거나 이로 인한 새로운 상승효과 또한 있다고 보기 어려우므로, 인용발명1, 인용발명2, MPEG-4 표준 및 주지관용기술로부터 용이하게 발명할 수 있습니다. (특허법 제29조2항)

[첨 부]

첨부1 Tallui,"Error resilient video coding in the ISO MPEG-4 standard", IEEE Comm. Magazine, June 1998, pp112-119, 1부 끝.

2004.06.24

특허청 전기전자심사국

영상기기심사담당관실 심사관 이진익

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<<안내>>

문의사항이 있으시면 ☎ 042)481-5770 로 문의하시기 바랍니다.

특허청 직원 모두는 깨끗한 특허행정의 구현을 위하여 최선을 다하고 있습니다. 만일 업무처리과정에서 직원의 부조리행위가 있으면 신고하여 주시기 바랍니다.

▶ 홈페이지(www.kipo.go.kr)내 부조리신고센터

THE FOLLOWING IS THE ENGLISH TRANSLATION OF THE ANNEXES TO THE INTERNATIONAL PRELIMINARY EXAMINATION REPORT: AMENDED SHEETS (Pages 3-8, 11-42, 53-54, 68-81/9, Figures 1, 2, 4, 20 and 26).

in the video decoding apparatus greatly degrades.

More specifically, in transmitting a compression-coded picture using a communication network, the receiving side must execute decoding processing of reconstructing significant information from a transmitted "0"/"1" bit stream.

For this purpose, the above-described header information is very important as information representing the rule of coding a set of predetermined bit steams. Examples of the header information are information representing the prediction type of frame being decoded (whether intraframe coding or interframe coding), information (time reference) representing the display timing of the frame, and step size information used in performing quantization.

If these pieces of header information are lost, information transmitted subsequently cannot be normally decoded.

For example, assume that an error is mixed in a bit stream owing to any cause, and the bit pattern changes to represent intraframe coding though the prediction type of frame is supposed to represent interframe coding. In this case, even if subsequent actual information is normally transmitted, the decoding side determines the signal as the result of intraframe coding, and cannot normally decode the signal at last.

Consequently, the quality of a reconstructed video picture in the video coding apparatus greatly degrades.

Mixture of errors frequently occurs in a system, such as a radio videophone, portable information terminal, or radio digital television receiver, that transmits and/or stores a video picture via a radio transmission line.

The mainstream of conventional picture transmission is a system using a cable communication network. Even in the use of a radio communication network, picture transmission assumes satellite communication whose error rate is very low. The structure of a coded stream to be transmitted does not sufficiently consider the error resilience, and important information such as header information is not satisfactorily protected against the transmission line error.

In a PHS (Portable Handyphone System) expected to become one of the mainstreams of future mobile communication, the error rate is about several hundred thousand to million times that of satellite communication. Therefore, errors cannot be fully corrected only by conventional error correction done for a coded bit stream.

In the Internet expected to become one of the mainstreams of future communication as well as the PHS, time at which an error is mixed and the type of mixed

error are not statistically clarified, and no proper error correction may be done.

However, the conventional construction has problems that the information capable of doubling using HEC includes no information required for coding arbitrary shape picture, and thus when VOP header information is lost by transmission error while the arbitrary shape picture is decoded in units of object, the arbitrary shape picture cannot be correctly decoded.

For this reason, in transmitting a code stream coded using arbitrary shape picture coding, the error resilience of transmission data weakens.

It can be attained by the present invention to make even in an arbitrary shape picture coding to have an error resilience similar to that in a conventional coding method for coding a rectangular picture.

Disclosure of Invention

The first invention provides a video coding apparatus comprising a coder unit for coding an input video picture to obtain a bit stream, an important information constructing unit for extracting, from coded information obtained by the coder unit, important information as information representing a rule of coding a set of predetermined bit streams, thereby constructing the important information, a sync signal generator unit for generating a sync signal, and a bit stream reconstructing unit for adding the sync signal

output from the sync signal generator unit and the important information reconstructed by the important information constructing unit to the bit stream coded by the coder unit, thereby reconstructing the bit stream.

The second invention provides a picture coding apparatus wherein the important information constructing unit in the first invention comprises a conventional picture relating important information constructing unit for constructing, from the coded information, conventional picture relating information as important information in a conventional coding scheme of coding a frame in units of rectangular regions, an arbitrary shape picture relating important information constructing unit for constructing, from the coded information, arbitrary shape picture relating important information as important information in an arbitrary shape coding scheme of coding a picture in the frame in units of arbitrary shape picture regions, an arbitrary shape coding determination unit for determining based on the coded information whether the coded picture is an arbitrary shape picture, a switch unit for outputting the arbitrary shape picture relating important information when the arbitrary shape coding determination unit determines that the coded picture is an arbitrary shape picture, and a multiplexer unit for multiplexing the conventional

picture relating information and an output from the switch unit.

The third invention provides a video decoding apparatus for decoding coded data including a bit stream including sync information that is obtained by coding a video picture, and includes, as header information, important information serving as information representing a rule of coding a set of predetermined bit streams, comprising a demultiplexer unit for demultiplexing an input bit stream into a picture bit stream, a decoder unit for decoding the picture bit stream, a sync signal detector unit for detecting a sync signal from the picture bit stream, and informing the decoder unit of the sync signal, an error check unit for checking presence of an error on the basis of decoded information of the decoder unit, and an important information constructing unit for constructing important information from header information output from the decoder unit, and informing the decoder unit of the important information when the error check unit determines absence of an error.

The fourth invention provides a video decoding apparatus wherein the important information constructing unit in the third invention comprises a conventional picture relating important information constructing unit for constructing conventional picture relating important information from the header

information, an arbitrary shape coding determination unit for determining based on the header information whether a decoded picture is an arbitrary shape picture, an arbitrary shape picture relating important information constructing unit for constructing arbitrary shape picture relating important information from the header information, a first switch unit for inputting the header information to the arbitrary shape picture relating information reconstructing unit when the arbitrary shape coding determination unit determines that the decoded picture is an arbitrary shape picture, and a second switch unit for outputting the arbitrary shape picture relating important information when the arbitrary shape coding determination unit determines that the decoded picture is an arbitrary shape picture.

The fifth invention provides a video decoding apparatus comprising a coder unit for coding an input video picture to obtain a bit stream, an important information constructing unit for extracting, from coded information obtained by the coder unit, important information as information representing a rule of coding a set of predetermined bit streams, thereby constructing the important information, a bit stream divider unit for dividing the bit stream coded by the coder unit, a packet header generator unit for generating a packet header from the important information constructed by the important information

According to the present invention, in video coding, a header can be set in coded data. At the same time, an expansion header can be set in the header to include important information in the arbitrary shape picture coding scheme, in addition to important information in the conventional picture coding scheme that is stored in the header. Even if some headers are destroyed, a picture can be decoded at a portion having normal headers. Further, a sync signal inserted in picture data can prevent out-of-synchronization of the video packet VP. The video packet VP is a packet starting from a sync signal RM. Even if an error exists before RM to cause out-of-synchronization, this sync signal RM can establish resynchronization.

Accordingly, the present invention can provide a video coding technique which attains high noise resilience in transmission and can give error resilience equivalent to that of conventional rectangular picture coding to even arbitrary shape picture coding.

Brief Description of Drawings

FIG. 1 is a block diagram showing the basic arrangement of a coder section according to the first embodiment of the present invention;

FIG. 2 is a block diagram showing in detail the basic arrangements of an important information constructing section and bit stream reconstructing

section in the coder section according to the first embodiment of the present invention;

FIG. 3 is a flow chart showing the basic flow of the bit stream reconstructing section according to the first embodiment of the present invention;

FIG. 4 is a view showing the expansion header format of VP according to the first embodiment of the present invention;

FIG. 5 is a block diagram showing the basic arrangement of a decoder section according to the first embodiment of the present invention;

FIG. 6 is a block diagram showing in detail the basic arrangement of an important information constructing section in the decoder section according to the first embodiment of the present invention;

FIG. 7 is a table for explaining a coded word structure used in the present invention;

FIG. 8 is a view showing an example for explaining the effect of variable-length coding;

FIG. 9 is a block diagram showing an arrangement of performing variable-length coding for important information;

FIG. 10 is a block diagram showing the basic arrangement of a coder section according to the second embodiment of the present invention;

FIG. 11 is a block diagram showing the detailed arrangement of an important information constructing

section in the coder section according to the second embodiment of the present invention;

FIG. 12 is a view showing an example of an expansion packet header according to the second embodiment of the present invention;

FIG. 13 is a view showing another example of the expansion packet header (with a marker) according to the second embodiment of the present invention;

FIG. 14 is a block diagram showing the basic arrangement of a decoder section according to the second embodiment of the present invention;

FIG. 15 is a block diagram showing the detailed arrangement of an important information construction section in the decoder section according to the second embodiment of the present invention;

FIG. 16 is a view for explaining coding of an arbitrary shape picture;

FIG. 17 is a view for explaining decoding of an arbitrary shape picture;

FIG. 18 is a view showing the VOP structure of MPEG-4;

FIG. 19 is a view showing the VP structure of MPEG-4;

FIG. 20 is a view showing the VP header format of MPEG-4;

FIG. 21 shows the problem of conventional VP;

FIG. 22 shows the effect of conventional VP;

FIG. 23 shows the effect of VP using HEC;

FIG. 24 is a view showing information necessary for synthesizing and playing back pictures in decoding an arbitrary shape picture;

FIG. 25 is a view showing an example of a radio video transmission system adopting a coding/decoding apparatus according to the third embodiment of the present invention;

FIG. 26 is a block diagram showing a coding apparatus according to the fourth embodiment that corresponds to the coding apparatus according to the first embodiment;

FIG. 27 is a block diagram showing a decoding apparatus according to the fourth embodiment that corresponds to the decoding apparatus according to the first embodiment;

FIG. 28 is a block diagram showing a decoding apparatus according to the fifth embodiment that corresponds to the coding apparatus according to the second embodiment;

FIG. 29 is a block diagram showing a decoding apparatus according to the fifth embodiment that corresponds to the decoding apparatus according to the second embodiment; and

FIG. 30 is a flowchart of a decoding apparatus according to the third embodiment.

Best Mode for Carrying Out of the Invention

Embodiments of the present invention will be described below with reference to the several views of the accompanying drawing.

The embodiments of the present invention will be described below with reference to the several views of the accompanying drawing.

FIG. 1 shows the basic arrangement of a video coding apparatus according to the first embodiment of the present invention. In FIG. 1, the output of a coder section 101 is connected to an important information constructing section 102 and bit stream reconstructing section 104. The output of the important information constructing section 102 is connected to the bit stream reconstructing section 104 together with the output of a sync signal generator section 103. The output of the bit stream reconstructing section 104 is connected to a multiplexer section 105. The output of the multiplexer section 105 is a transmission line 106.

The coder section 101 codes an input video signal 131 to output it to the bit stream reconstructing section 104, and outputs coded information 133 obtained by coding to the important information constructing section 102. The important information constructing section 102 receives the video signal 131 obtained by coding in the coder section 101, and selects and

outputs only important information 134 necessary for decoding.

The sync signal generator section 103 generates a sync signal 135 at an arbitrary interval. The bit stream reconstructing section 104 inserts the sync signal 135 from the sync signal generator section 103 in a bit stream 132. If necessary, the bit stream reconstructing section 104 inserts the important information 134 output from the important information constructing section 102 after the sync signal 135 in accordance with a predetermined format, and outputs the resultant bit stream.

The multiplexer section 105 multiplexes a bit stream 136 reconstructed by the bit stream reconstructing section 104 with another data (e.g., speech data, or bit stream prepared by coding another object) to output a multiplexed bit stream 137 to the transmission line/storage medium 106.

In this arrangement, the input video signal 131 is coded by the coder section 101. The bit stream 132 output from the coder section 101 upon coding is input to the bit stream reconstructing section 104. The coded information 133 obtained by coding in the coder section 101 is input to the important information constructing section 102, which selects and outputs only the important information 134 necessary for decoding.

The bit stream reconstructing section 104 inserts in the bit stream 132 the sync signal 135 output from the sync signal generator section 103 at an arbitrary interval. If necessary, the bit stream reconstructing section 104 inserts the important information 134 output from the important information constructing section 102 after the sync signal 135 in accordance with a predetermined format.

The bit stream 136 reconstructed by the bit stream reconstructing section 104 is input to the multiplexer section 105 where the bit stream 136 is multiplexed with another data (e.g., speech data, or bit stream prepared by coding another object) to output the multiplexed bit stream 137 to the transmission line/storage medium 106.

According to the first embodiment, the sync signal 135 output from the sync signal generator section 103 at an arbitrary interval is inserted in a bit stream obtained by coding a video picture. If necessary, the important information 134 output from the important information constructing section 102 is inserted after the sync signal 135 by the bit stream reconstructing section 104 in accordance with a predetermined format.

The important information constructing section 102 generates, as the important information 134, information necessary for arbitrary shape picture coding/decoding in MPEG-4, for example in arbitrary

shape picture coding, information about the width VW of the picture size, information about the height VH, information about the x-coordinate VHMSR of the picture position for indicating the display position of a decoded picture, information about the y-coordinate VVMSR, the VOP shape coding type "vop_shape_coding_type (VSCT)" representing the coding mode of shape information, and the flag change_conv_ratio_disable (CCRD) representing whether coding is done after the size of shape information is converted. The pieces of important information are duplicated and inserted in a VP header by the bit stream reconstructing section 104 in accordance with a predetermined format, and then arbitrary shape picture coding can also attain error resilience equivalent to that of rectangular picture coding. Even if some VOP headers or VPs are destructed, a video picture can be decoded.

In MPEG-4, a video object plane "Video Object Plane" corresponds to the frame (FIG. 18). The Video Object Plane (to be referred to as VOP hereinafter) can be divided into a plurality of packets, and each packet is called a video packet "Video Packet" (FIG. 19).

The video packet "Video Packet" (to be referred to as VP hereinafter) is a packet starting from a sync signal (Resync Marker; to be referred to as RM hereinafter). Even if an error exists before RM to cause out-of-synchronization, this sync signal enabled

resynchronization.

Even if, therefore, information is destroyed/lost by an error, subsequent video packets VP could be normally decoded so long as the video packets VP are not a start packet. This is because the start VOP header of the video object plane VOP has been decoded to provide all the pieces of information necessary for decoding (FIG. 20).

As described above, VOP header information includes the coding type (intraframe coding, interframe coding, and the like) of video object plane VOP, the time reference, and the step size. If this information is lost, all the video packets VP could not be decoded (FIGS. 21A and 21B).

In MPEG-4, the header extension code HEC is defined in the header of the video packet VP, and thus thereafter re-describing important information in the VOP header enabled based on the HEC value.

This format is shown in FIGS. 21A and 21B. As shown in FIG. 21A, the video object plane VOP was constructed with a format in which a pattern of a VOP header and subsequent data is set at the start, and a pattern of a video packet VP header and subsequent data is repeated several times.

The header extension code HEC is defined in the VP header, and important information in the VOP header is described again with the HEC value. Unless the video

object plane VOP is destroyed, normal pairs of VP headers and data could be decoded using information of the VOP header and data even if one or two pairs of the headers of video packets VP and subsequent data are destroyed.

In the example of FIGS. 22A and 22B, the header of the video object plane VOP and its paired data are not destroyed, but only the header of the first video packet VP and its paired data are destroyed. In this case, the video object plane VOP and its data are not destroyed, as shown in FIG. 22B. Thus, the first region of a picture can be normally decoded. In the second region, an error occurs to decode a degraded picture. The third and subsequent regions of the picture are normally decoded. The picture could be decoded as one which is partially destroyed but almost completely reconstructed.

In a scheme using no header extension code HEC, if the VOP header is destroyed, no picture can be decoded regardless of the remaining normal VPs, as shown in FIG. 22A, and no picture can be obtained under the influence of the error, as shown in FIG. 22B. Even in this case, the picture could be reconstructed by the scheme using the header extension code HEC. That is, in the scheme using the header extension code HEC, when the header extension code HEC is true, important information is duplicated after HEC; and when HEC is

false, important information is not duplicated. In using a transmission line whose error rate is high, HEC is set to be true, and important information is duplicated and added after the HEC.

Even if an error exists at the start of VOP to fail in decoding, as shown in FIG. 23A, information protected by HEC can be used to decode video packets VP in the second and subsequent regions though the picture of the start region cannot be normally decoded. The picture can be decoded as one which is partially destroyed but almost completely reconstructed can be decoded, as shown in FIG. 23B.

However, this could only be realized in units of rectangular picture regions. More specifically, VOP header information is duplicated in the VP header using HEC. Even when the VOP header is lost, subsequent data can be normally decoded using the VOP header so long as the VOP header is duplicated in the VP header using HEC. However, information which can be duplicated using HEC does not include any information necessary for arbitrary shape picture coding. Although a conventional rectangular picture can be decoded without any problem, a scheme such as MPEG-4 capable of coding an arbitrary shape picture in units of objects could not decode any picture.

Arbitrary shape picture coding in units of objects in MEPG-4 uses a larger number of pieces of header

information than in rectangular picture coding. For this reason, it was problems that header information cannot be duplicated.

From another viewpoint, as the Internet, intranet, and the like are becoming popular, these networks are often used for communication. Also, Internet videophones and the like are being used. In this case, a video picture is transmitted in real time. However, a video picture transmitted in real time via the Internet, intranet, or the like poses many problems in generally used TCP and UDP protocols. A serious problem is that the header does not have any time information.

To prevent this, an RTP (Real-time Transfer Protcol) recently receives a great deal of attention as a protocol used to transmit video picture/speech data. That is, a protocol such as TCP does not have any time information to each packet, so the receiving side cannot obtain the time when received data is reconstructed. When data is transmitted in units of packets, the receiving side cannot satisfactorily reconstruct video picture data or speech/sound data.

However, RTP adds time information to each packet to allow the receiving side to reconstruct video picture data and speech/sound data based on the time information. In this manner, RTP is suitable for real-time data transmission.

This protocol can define an expansion header for each application.

As described in the prior art, MPEG-4 duplicates VOP header information in a VP header using HEC. Even if the VOP header is lost, subsequent data could be normally decoded using the VOP header as far as the VOP header is duplicated in the VP header using HEC.

However, information which can be duplicated using HEC does not include any information necessary for arbitrary shape picture coding. A conventional rectangular picture can be decoded without any problem. To the contrary, arbitrary shape picture coding uses a larger number of pieces of header information than in rectangular picture coding. Hence, it was serious problems that header information cannot be duplicated.

For example, since the picture size changes in units of VOPs in arbitrary shape picture coding, a width vop_width (to be referred to as VW hereinafter) and a height vop_height (to be referred to as VH hereinafter) of the picture size are described in the VOP header. Also, an x-coordinate vop_horizontal_mc_spatial_ref (to be referred to as VHMSR hereinafter) and a y-coordinate vop_vertical_mc_spatial_ref (to be referred to as VVMSR hereinafter) of the picture position for indicating the display position of a decided picture are described. The relationship between these values is shown in

FIG. 24.

When a video picture is to be decoded using only information of the video packet VP without these pieces of information, a picture cannot be normally decoded in arbitrary shape picture coding. In other words, a picture could not be normally decoded in arbitrary shape picture coding without information about the width VW of the picture size, information about the height VH, information about the x-coordinate VHMSR of the picture position for indicating the display position of a decoded picture, and information about the y-coordinate VVMSR.

Normally coding a picture also requires a VOP shape coding type "vop_shape_coding_type (to be referred to as VSCT hereinafter) representing the coding mode of shape information, and a flag change_conv_ratio_disable (to be referred to as CCRD hereinafter) representing whether coding is done after the size of shape information is converted.

These pieces of information are not protected in duplication of the VOP header using HEC in MPEG-4.

In this fashion, the system can give error resilience equivalent to that of conventional rectangular picture coding to even arbitrary shape picture coding. The important information constructing section 102 and bit stream reconstructing section 104 as important features of the present invention in the

above arrangement will be described in detail with reference to FIG. 2.

The important information constructing section 102 will be explained in detail.

As shown in FIG. 2, the important information constructing section 102 is constituted by a conventional picture relating important information constructing section 206, arbitrary shape picture relating important information constructing section 207, arbitrary shape coding determination section 208, and multiplexer section 210.

Of these sections, the conventional picture relating important information constructing section 206 receives the coded information 133 from the coder section 101, selects information (e.g., coding mode and time reference) determined to be important based on the coded information 133 in conventional coding, and outputs the information as conventional picture relating important information 238 to the multiplexer section 210. The arbitrary shape picture relating important information constructing section 207 selects important information (e.g., picture size, position, coding mode, and reduction mode) relating to arbitrary shape picture coding, and outputs the information as arbitrary shape picture relating important information 239.

The arbitrary shape coding determination section

208 determines whether a coded picture is a conventional rectangular picture or arbitrary shape picture, and outputs the determination result as a determination signal 240.

A switch section 209 executes switch control of determining based on the determination signal 240 from the arbitrary shape coding determination section 208 whether the arbitrary shape picture relating important information 239 from the conventional picture relating important information constructing section 207 is output to the multiplexer section 210. The multiplexer section 210 multiplexes the conventional picture relating important information 238 from the conventional picture relating important information constructing section 206, and the arbitrary shape picture relating important information 239 output from the arbitrary shape coding determination section 208 in arbitrary shape picture coding, and outputs the multiplexed information as the important information 134.

In this arrangement, the coded information 133 from the coder section 101 is input to the conventional picture relating important information constructing section 207 as a construction component of the important information constructing section 102. The conventional picture relating important information constructing section 207 selects information (e.g.,

coding mode and time reference) determined to be important in conventional coding, and outputs the selected information as the conventional picture relating important information 238 to the multiplexer section 210. As a result, the conventional picture relating important information 238 is a set of pieces of information such as the coding mode and time reference determined to be important in general coding.

Then, the arbitrary shape picture relating important information constructing section 207 selects important information (e.g., picture size, position, coding mode, and reduction mode) relating to arbitrary shape picture coding, and outputs the selected information as arbitrary shape picture relating important information 238 to the multiplexer section 210.

The arbitrary shape coding determination section 208 determines whether a coded picture is a conventional rectangular picture or arbitrary shape picture, and outputs the determination result as the determination signal 240. This determination signal 240 controls the switch section 209 which performs switch control of determining whether the arbitrary shape picture relating important information 239 from the conventional picture relating important information constructing section 207 is output.

The multiplexer section 210 multiplexes the

conventional picture relating important information 238 and arbitrary shape picture relating important information 239 in arbitrary shape picture coding, and outputs the multiplexed information as the important information 134.

As a result, the conventional picture relating important information 238 and arbitrary shape picture relating important information 239 in arbitrary shape picture coding can be output as the multiplexed important information 134 from the multiplexer section 210. In conventional picture coding, only the conventional picture relating important information 238 can be output as the important information 134.

The bit stream reconstructing section 104 will be described in detail. As shown in the upper half of FIG. 2, the bit stream reconstructing section 104 is comprised of an MB boundary determination section 201, counter 202, sync signal inserting determination section 203, header information inserting section 205, and adder section 206.

Of these sections, the MB boundary determination section 201 determines for the bit stream 132 input after being coded by the coder section 101 whether data of the bit stream corresponds to the boundary of a macroblock MB. The number-of-coded-bits counter section 202 counts the number of coded bits of the bit stream 132 input after being coded by the preceding

coder section 101.

When the MB boundary determination section 201 determines that the bit stream 132 corresponds to an MB boundary, and the count value of the number-of-coded-bits counter section 202 for the bit stream 132 exceeds a given value, the sync signal inserting determination section 203 outputs an insertion permission signal 234.

The header information inserting section 205 prepares header information from the input important information 134 and sync signal 135. When the sync signal inserting determination section 203 determines that insertion is permitted, the header information inserting section 205 outputs header information 237 prepared for the coded bit stream 132 to the adder section 206.

The adder section 206 adds the bit stream 132 input after being coded by the coder section 101 to an output from the header information inserting section 205, and outputs the sum as the reconstructed bit stream 136 of the bit stream reconstructing section 104.

When the bit stream reconstructing section 104 having this arrangement receives the bit stream 132 coded by the coder section 101, the section 104 inputs the bit stream 132 to the MB boundary determination section 201 and number-of-coded-bits counter section 202 as construction components of the bit stream

reconstructing section 104. The MB boundary determination section 201 determines whether the input bit stream 132 corresponds to an MB boundary.

The number-of-coded-bits counter section 202 counts the number of coded bits of the bit stream 132. When the MB boundary determination section 201 determines that the bit stream 132 corresponds to an MB boundary, and the number of coded bits counted by the counter 202 exceeds a given value, the sync signal inserting determination section 203 generates the insertion permission signal 234 to output it to the header information inserting section 205.

The header information inserting section 205 prepares header information from the input important information 134 and sync signal 135, and outputs the prepared header information 237 to the adder section 206 in order to add the header information 237 to the coded bit stream 132. The adder section 206 inserts the header information 237 in the coded bit stream 132 to output the reconstructed bit stream 136. This bit stream 136 is output from the bit stream reconstructing section 104.

As a result, the insertion permission signal 234 is generated if the number of coded bits exceeds a predetermined value when the bit stream 132 of picture data input after being coded by the coder section is examined to find that a bit at the boundary position of

the macroblock MB is input. Header information prepared by the header information inserting section 205 based on the input important information 134 and sync signal 135 can be added to the bit stream 132.

In the important information constructing section 102, the conventional picture relating important information constructing section 206 as one construction component selects information (e.g., coding mode and time reference) determined to be important in conventional coding based on the coded information 133 from the coder section 101, and outputs the selected information as the conventional picture relating important information 238. The arbitrary shape picture relating important information constructing section 207 as one construction component of the important information constructing section 102 selects important information (e.g., picture size, position, coding mode, and reduction mode) relating to arbitrary shape picture coding, and outputs the selected information as the arbitrary shape picture relating important information 239. Only the conventional picture relating important information 238 is obtained for a conventional picture, whereas the conventional picture relating important information 238 and arbitrary shape picture relating important information 239 are multiplexed in coding an arbitrary shape picture. Therefore, header information inserted

in a bit stream can include conventional picture relating important information and arbitrary shape picture relating important information. The VP header can include information necessary to play back the picture of MPEG-4 coded data.

FIG. 3 is a flow chart showing preparation of header information.

As the first step (step S502), the bit stream reconstructing section 104 determines whether a bit stream input from the coder section 101 corresponds to the boundary position of MB (MacroBlock).

If Y in step S502, whether a sync signal RM is to be inserted is determined as the second step (step S503). This determination can be done based on an arbitrary algorithm of the user.

For example, various methods can be adopted: an algorithm of inserting the sync signal RM when the number of bits after a preceding sync signal exceeds a predetermined value, or an algorithm of determining whether RM is inserted along a picture configuration when the number of MBs after a preceding sync signal exceeds a predetermined value.

The video packet VP starts from the sync signal RM. Even if an error exists before the sync signal RM to cause out-of-synchronization, this sync signal RM can establish resynchronization.

If Y in step S503, RM is inserted, and a VP header

subsequent to RM is inserted (step S504 in FIG. 3). Then, the flow advances to step S505.

In the third step (step S505), whether important information of the VOP header is duplicated as an expansion header is determined.

If Y in step S505, HEC is true, and important information in rectangular picture coding is selected and output from the VOP header (step S506 in FIG. 3). The flow shifts to step S507.

In the last fourth step (step S507), whether the picture is an arbitrary shape picture is determined. If Y in step S507, important information in arbitrary shape picture coding within the VOP header is selected and output (step S508 in FIG. 3).

The VP header is generated through the four steps, and inserted in a bit stream.

FIG. 4 shows a structure of a VP header in an arbitrary shape picture. An expansion header Ex-Header is added to the conventional VP header shown in FIG. 20. This expansion header Ex-Header additionally includes important information in arbitrary shape picture coding, i.e., the width (VW) and height (VH) of a picture, an x-coordinate (VHMSR) and y-coordinate (VVMSR) at which the picture is pasted, a flag (CCRD) representing whether shape information is reduced and coded, and information (VSCT) about the coding type (intraframe coding, interframe coding, or the like) of picture

information.

Note that important information in arbitrary shape picture coding is not limited to the above information. Depending on an application purpose, another information can be added, or information can be reduced. However, the transmitting and receiving sides must have consensus on the header format.

The video coding apparatus comprises the function of extracting important information in arbitrary shape picture coding, the function of determining whether an arbitrary shape picture is used, and the function of detecting the boundary of a macroblock. The VP header includes an expansion header which includes a sync signal in addition to important information in conventional picture coding, and important information for arbitrary shape picture coding in arbitrary shape picture coding. Even if some headers are destroyed, a picture can be decoded at a portion having normal headers. Further, the sync signal prevents out-of-synchronization of the video packet VP. That is, even if the video packet VP starting from the sync signal RM has an error before the sync signal RM to cause out-of-synchronization, the sync signal RM can establish resynchronization.

Accordingly, the first embodiment can provide a video coding technique which attains high noise resilience in transmission and can give error

resilience equivalent to that of conventional rectangular picture coding to even arbitrary shape picture coding.

The arrangement and processing on the coding side has been explained in detail. Next, the arrangement and processing on the decoding side will be explained in detail.

The decoder section will be described. In the decoder section according to the first embodiment shown in FIG. 5, the output of a demultiplexer section 302 is connected to a decoder section 303 and sync detector section 304. The output of the sync detector section 304 is connected to the other input of the decoder section 303. The output of the decoder section 303 is connected to an error check section 305. The output of the error check section 305 is connected to the output of the decoder section 303 and an important information constructing section 306. The output of the important information constructing section 306 is connected to the decoder section 303.

The demultiplexer section 302 demultiplexes a bit stream 331 received from the transmission line/storage medium 106 into a picture bit stream 332 and another data. The sync detector section 304 detects the sync signal RM from the bit stream 332 output from the demultiplexer section 302. The decoder section 303 decodes the picture bit stream 332 output after being

demultiplexed by the demultiplexer section 302, and generates picture data. At this time, the decoder section 303 executes decoding processing in synchronism with a sync signal detected by the sync detector section 304.

The important information constructing section 306 obtains data being decoded by the decoder section 303. If VOP (Video Object Plane) being decoded by the decoder section 303 includes a VOP header, the important information constructing section 306 extracts information of the VOP header, and outputs it to the decoder section 303.

The error check section 305 checks decoded information 334 output from the decoder section 303 to detect whether an error occurs during decoding operation. If an error is detected, the error check section 305 informs the important information constructing section 306 of generation of the error in decoding processing so as to stop outputting important information to the decoder section 303.

If an error occurs, the decoder section 303 performs processing corresponding to the error. After processing corresponding to the error, the decoder section 303 performs decoding operation from the position of a next sync signal detected by the sync detector section 304.

In this arrangement, the bit stream 331 received

from the transmission line/storage medium 106 is demultiplexed into the picture bit stream 332 and another data by the demultiplexer section 302. This another data is transmitted to a corresponding decoder section.

The picture bit stream 332 demultiplexed by the demultiplexer section 302 is input to the decoder section 303 where the bit stream 332 is decoded. During decoding processing, a sync signal is detected from the bit stream 332 by the sync signal detector section 304.

The error check section 305 checks whether an error occurs during decoding operation, from the decoded information 334 obtained by decoding processing of the decoder section 303. If an error is detected, processing corresponding to the error is executed by the decoder section 303, and decoding operation is done at the position of a next sync signal detected by the sync detector section 304.

The decoder section 303 determines the type of next sync signal. If the signal is the sync signal RM, and an error signal 335 is true, the decoder section 303 obtains VOP header information 343 from the important information constructing section 306.

When a VOP header exists in VOP (Video Object Plane) being decoded by the decoder section 303, the important information constructing section 306 outputs

information of the VOP header; and when no VOP header exists in VOP being decoded, the important information constructing section 306 outputs important information so long as the important information is inserted by HEC within the VP header.

Decoding processing in the decoder section 303 uses important information obtained by the important information constructing section 306. If a VOP header exists in VOP (Video Object Plane) being decoded by the decoder section 303 in the important information obtained by the important information constructing section 306, the information of the VOP header is output; and if no VOP header exists in VOP being decoded, important information is output as far as the important information is inserted by HEC within the VP header. On the coding side, important information includes not only important information in conventional picture coding but also important information in arbitrary shape picture coding. Even if some headers are destroyed, a picture can be decoded from data having normal headers regardless of whether the data is obtained by coding a conventional picture or arbitrary shape picture. Further, the sync signal prevents out-of-synchronization of the video packet VP. That is, even if the video packet VP starting from the sync signal RM has an error before the sync signal RM to cause out-of-synchronization, the sync signal RM can

establish resynchronization.

Accordingly, the first embodiment can provide the decoding technique of a video coding technique which attains high noise resilience in transmission and can give error resilience equivalent to that of conventional rectangular picture coding to even arbitrary shape picture coding.

According to this technique, the noise resilience in transmission is attained by transmitting, as header information, not only important information in conventional picture coding but also important information for arbitrary shape picture coding in arbitrary shape picture coding. On the receiving side, it is important how to extract the important information, transmit it to the decoder section 303, and use the important information for decoding processing.

The feature of the first embodiment is, therefore, the important information constructing section 306. The important information constructing section 306 will be described in detail with reference to FIG. 6.

As shown in FIG. 6, the important information constructing section 306 comprises a conventional picture relating important information constructing section 307, arbitrary shape coding determination section 308, switch sections 309 and 311, and arbitrary shape picture relating important information

constructing section 310.

When a VP header is detected in the decoder section 303, the conventional picture relating important information constructing section 307 decodes coding mode information, time reference, and the like in information of the VP header, and outputs the decoded information.

The arbitrary shape coding determination section 308 determines whether a picture being decoded by the decoder section 303 is an arbitrary shape picture or conventional rectangular picture. The switch sections 309 and 311 are switched in accordance with the determination result. The switch sections 309 and 311 are system switches for two sections.

The arbitrary shape picture relating important information constructing section 310 decodes important information (e.g., picture size and picture position) relating to an arbitrary shape picture. For an arbitrary shape picture, the switch sections 309 and 311 are switched to be connected to the arbitrary shape picture relating important information constructing section 310. Then, important information relating to the arbitrary shape picture is reconstructed, and supplied to the decoder section 303 in addition to important information relating to a conventional picture from the conventional picture relating important information constructing section 307. Thus,

the decoder section 303 can also decode the arbitrary shape picture.

In the important information constructing section 306 having this arrangement, when the decoder section 303 detects a VP header in an input bit stream, the conventional picture relating important information constructing section 307 decodes coding mode information, time reference, and the like.

The arbitrary shape coding determination section 308 determines whether a picture being decoded by the decoder section 303 is an arbitrary shape picture or conventional rectangular picture, and generates a control signal corresponding to the determination result.

The control signal from the arbitrary shape coding determination section 308 controls the switch sections 309 and 311. For an arbitrary shape picture, the arbitrary shape picture relating important information constructing section 310 decodes important information (e.g., picture size and picture position) relating to the arbitrary shape picture, prepares the final important information 343, and supplies it to the decoder section 303 as an output from the important information constructing section 306. As far as an expansion header is set in a header, and includes important information relating to an arbitrary shape picture, the decoding side can extract the important

information to supply the important information necessary for decoding the arbitrary shape picture to the decoder section 303.

In this manner, the first embodiment can give error resilience equivalent to that of conventional rectangular picture coding to even arbitrary shape picture coding.

In the first embodiment and the second embodiment (to be described later), "picture size" and "position information" must be described in arbitrary shape picture coding. Each of these pieces of information is expressed by 13 bits in MPEG-4, each of "picture size" and "position information" requires horizontal information and vertical information, and thus 4 × 13 bits = 52 bits are required. These bits may be large redundant data in transmission at a low bit rate. For this reason, the data is transmitted after being compressed as much as possible. This method will be described.

The size of the video object plane VOP or the like is expressed by 13 bits in MEPG-4. In many cases, however, all the 13 bits are not used. From this, a method of expressing the size by a variable length and decreasing the number of bits will be considered.

Basically, the size is expressed by a pair of "coded word length" + "value". As shown in FIG. 7, a header portion representing the code length and a

header in this case. In FIG. 12, each figure represents the number of bits, and one horizontal line represents 32 bits. In MEPG-4, VW, VH, VHMSR, and VVMSR are expressed by 13 bits each, and CCED and VSCT are expressed by 1 bit each.

Herein, a reserve "Reserve" bit (RV) is inserted at last in order to align information into 32 bits. If VW, VH, and the like may successively appear like a bit stream such as a sync signal, for example, markers (M) may be inserted between respective values to prevent forming a bit stream like a sync signal which must not appear, as shown in FIG. 13. The position of the marker M is not limited to the boundary between pieces of information, and may be inserted at any position so long as the same rule is established between the transmitting and receiving sides.

A flag representing the presence of an expansion header must finally be inserted in conventional header information. Thus, 1-bit information representing whether an expansion header exists in a conventional header is inserted. These formats are merely examples. Alternatively, header information can be formed from only some of these data or a combination with another information.

According to the second embodiment, in coding and packetting a video picture, an expansion header can be added to a packet header for inserting conventional

picture relating important information. When an arbitrary shape picture is to be coded and transmitted, its arbitrary shape picture relating important information is inserted in the expansion header, added as a packet header to data, and packetted. Hence, an arbitrary shape picture can be reconstructed in units of packets. Even arbitrary shape picture coding can attain error resilience equivalent to that of conventional rectangular picture coding. Even if some VOP headers or VPs are destroyed, a video picture can be decoded.

An example of a decoder section for decoding this packet will be described.

An arrangement of the decoder section will be explained. In the decoder section shown in FIG. 14, the output of a demultiplexing section 702 for receiving a coded bit stream is connected to a decoder section 703 and important information construction section 705. The output of the decoder section 703 is connected to the important information construction section 705 via an error check section 704. The output of the important information construction section 705 is connected to the decoder section 703. The demultiplexing section 702 performs demultiplexing for a bit stream 731 input from the transmission line/storage medium 106 into a picture bit stream 732, packet header 735, and another data.

C L A I M S

1. A video coding apparatus comprising:

a coder section for generating coded information obtained by coding an input video picture as a bit stream;

an important information reconstructing section for extracting, from the coded information obtained by said coder section, important information representing a rule of coding a set of predetermined bit streams, and reconstructing the important information;

a sync signal generator section for generating a sync signal; and

a bit stream reconstructing section for adding the sync signal output from said sync signal generator means and the important information reconstructed by said important information reconstructing section to the bit stream coded by said coder section, to reconstruct the bit stream.

2. The video coding apparatus according to claim 1, wherein said important information constructing section comprises:

a first important information reconstructing section for reconstructing, from the coded information, conventional picture relating information as important information in a conventional coding scheme of coding a frame in units of rectangular regions;

a second important information reconstructing

section for reconstructing, from the coded information, arbitrary shape picture relating important information as important information in an arbitrary shape coding scheme of coding a picture in the frame in units of arbitrary shape picture regions;

an arbitrary shape coding determination section for determining based on the coded information whether the coded picture is an arbitrary shape picture;

a switch section for outputting the arbitrary shape picture relating important information when said arbitrary shape coding determination section determines that the coded picture is an arbitrary shape picture; and

a multiplexer section for multiplexing the conventional picture relating information and an output from said switch section.

3. The video coding apparatus according to claim 2, wherein said arbitrary shape coding determination section determines whether the coded picture is a rectangular picture or an arbitrary shape picture to output a determination signal and controls said switch section in accordance with the determination signal.

4. The video coding apparatus according to claim 1, wherein said bit stream reconstructing section doubles the important information in a predetermined format and insert the doubled important information

into a header.

5. The video coding apparatus according to claim 1, wherein said bit stream reconstructing section comprises a macroblock boundary determination section for determining whether or not the coded bit stream is positioned on a macroblock boundary, a counter for counting bits of the coded bit stream, a sync signal inserting determination section for outputting an insertion permission signal when the macroblock boundary determination section determines the macroblock boundary for the bit stream and a count value of the bits of the bit stream exceeds a given value, a header information inserting section for forming expansion header information from the important information and the sync signal and adding the expansion information to the coded bit stream in response to the insertion permission signal from said sync signal inserting determination section.

6. The video coding apparatus according to claim 5, wherein the expansion header information is provided in a video packet starting at the sync signal.

7. A video decoding apparatus comprising:

a bit stream receiving section for receiving a bit stream including coded video information that is obtained by coding a video picture, sync information and header information including important information representing a rule of coding a set of predetermined

bit streams,

a demultiplexer section for demultiplexing the coded bit stream into a picture bit stream corresponding to the video information;

a decoder section for decoding the picture bit stream;

a sync signal detector section for detecting a sync signal from the bit stream, and informing said decoder section of the sync signal;

an error check section for checking presence of an error on the basis of decoded information of said decoder section; and

an important information reconstructing section for reconstructing important information from the header information output from said decoder section, and informing said decoder section of the important information when said error check section determines absence of an error.

8. The video decoding apparatus according to claim 7, wherein said important information reconstructing section comprises:

a first important information reconstructing section for reconstructing conventional picture relating important information from the header information;

an arbitrary shape coding determination means for determining based on the header information whether a

picture decoded from the header information is an arbitrary shape picture;

a second important information reconstructing means for reconstructing arbitrary shape picture relating important information from the header information;

a first switch section for inputting the header information to said second important information reconstructing section when said arbitrary shape coding determination section determines that the decoded picture is an arbitrary shape picture; and

a second switch section for outputting the arbitrary shape picture relating important information when said arbitrary shape coding determination section determines that the decoded picture is an arbitrary shape picture.

9. The video decoding apparatus according to claim 7, wherein said important information reconstructing section outputs VOP header information when a VOP header is included in the bit stream obtained during decoding of said decoder section, and outputs the important information of the VOP when no VOP header is included in the bit stream obtained during decoding of said decoder section.

10. The video decoding apparatus according to claim 9, wherein said important information reconstructing section decodes the conventional picture

relating important information when the VOP header is found from the bit stream in said decoder section.

11. The video decoding apparatus according to claim 7, wherein said decoder section executes a decoding operation from a position of a next sync signal detected by said sync signal detector section after performing a processing corresponding to an error when said error check section detects the error.

12. A video coding apparatus comprising:

a coder section for generating coded information obtained by coding an input video picture as a bit stream;

an important information reconstructing section for extracting, from the coded information obtained by said coder section, important information representing a rule of coding a set of predetermined bit streams, and reconstructing the important information;

a bit stream divider section for dividing the bit stream coded by said coder section into a plurality of divided bit strings;

a packet header generator section for generating a packet header from the important information reconstructed by said important information reconstructing section; and

a packet constructing section for constructing a packet using the divided bit strings and the packet header.

13. The video coding apparatus according to claim 12, wherein said important information reconstructing section comprises:

an arbitrary shape picture relating important information reconstructing section for reconstructing arbitrary shape picture relating important information from the coded information;

an expansion header insertion determining section for determining based on the coded information whether an expansion header holding the arbitrary shape picture relating important information is to be inserted in the packet header; and

a switch section for inputting the header information to the arbitrary shape picture relating important information when said expansion header insertion determining section determines that the expansion header is to be inserted.

14. The video coding apparatus according to claim 12, wherein said packet header generator section outputs the packet header containing the important information therein to said packet constructing section, and said bit stream divider section divides the bit stream output from said coder section in a packet size and outputs it.

15. A video decoding apparatus comprising:

a bit stream receiving section for receiving a bit stream including coded video information obtained by

coding a video picture, sync information, and packet header information including important information representing a rule of coding a set of predetermined bit streams when the video picture is coded;

a demultiplexer section for demultiplexing the bit stream into a picture bit string of the video picture information and packet header information;

a decoder section for decoding the picture bit string;

an error check section for checking presence of an error on the basis of decoded information of said decoder section; and

an important information reconstructing section for extracting and reconstructing the important information from the packet header information, and informing said decoder section of the reconstructed important information, when said error check section determines presence of an error and the important information is required in decoding.

16. The video coding apparatus according to claim 15, wherein said important information reconstructing section comprises:

a first important information reconstructing section for reconstructing arbitrary shape picture relating important information from the packet header information;

an expansion header insertion determining section

for determining based on the packet header information whether an expansion header is inserted in the packet header; and

a switch section for inserting the packet header information to the arbitrary shape picture relating important information when said expansion header insertion determining section determines that the expansion header is inserted.

17. A video transmission system comprising:

a server computer including a video coding apparatus for coding a video to generate a coded bit stream;

a transmitter for transmitting the coded bit stream of said server computer;

a receiver for receiving the coded bit stream from said server computer; and

a client computer including a video decoding apparatus for decoding the coded bit stream from said receiver, and wherein

said video coding apparatus comprises:

a coder section for generating coded information obtained by coding an input video picture as a bit stream;

an important information reconstructing section for extracting, from the coded information obtained by said coder section, important information representing a rule of coding a set of predetermined bit streams,

and reconstructing the important information;

a sync signal generator section for generating a sync signal; and

a bit stream reconstructing section for adding the sync signal output from said sync signal generator means and the important information reconstructed by said important information reconstructing section to the bit stream coded by said coder section, to reconstruct the bit stream, and

said video decoding apparatus comprises:

a demultiplexer section for demultiplexing the received coded bit stream into a picture bit stream corresponding to the video information;

a decoder section for decoding the picture bit stream;

a sync signal detector section for detecting a sync signal from the bit stream, and informing said decoder section of the sync signal;

an error check section for checking presence of an error on the basis of decoded information of said decoder section; and

an important information reconstructing section for reconstructing important information from the header information output from said decoder section, and informing said decoder section of the important information when said error check section determines absence of an error.

18. A video transmission system comprising:

a server computer including a video coding apparatus for coding a video to generate a coded bit stream;

a transmitter for transmitting the coded bit stream of said server computer;

a receiver for receiving the coded bit stream from said server computer; and

a client computer including a video decoding apparatus for decoding the coded bit stream from said receiver, and wherein

said video coding apparatus comprises:

a coder section for generating coded information obtained by coding an input video picture as a bit stream;

an important information reconstructing section for extracting, from the coded information obtained by said coder section, important information representing a rule of coding a set of predetermined bit streams, and reconstructing the important information;

a bit stream divider section for dividing the bit stream coded by said coder section into a plurality of divided bit strings;

a packet header generator section for generating a packet header from the important information reconstructed by said important information constructing section; and

a packet constructing section for constructing a packet using the divided bit strings and the packet header, and

said video decoding apparatus comprises:

a demultiplexer section for demultiplexing the received bit stream into a picture bit string of the video picture information and packet header information;

a decoder section for decoding the picture bit string;

an error check section for checking presence of an error on the basis of decoded information of said decoder section; and

an important information reconstructing section for extracting and reconstructing the important information from the packet header information, and informing said decoder section of the reconstructed important information, when said error check section determines presence of an error and the important information is required in decoding.

19. A recording medium storing:

a shape information header storing arbitrary information of a picture to be recorded; and

a plurality of VOPs (Video Object Planes) each including a plurality of macroblocks, each of the macroblocks being constructed by a VP header and MB data following the VP header, and the VP header

including important information representing a rule of coding a set of predetermined bit streams.

20. The recording medium according to claim 19, wherein the important information of the VP header includes information about a width of a picture, information about a height of the picture, information about x-and y coordinates at which the picture is pasted, a flag representing whether coding is done after the shape information is scaled-down, and information about a coding type of the shape information.

21. A video decoding apparatus comprising:

demultiplexer means for demultiplexing an input bit stream into a picture stream;

decoder means for decoding the picture bit stream;

sync signal detector means for detecting a sync signal from the picture bit stream, and informing said decoder means of the sync signal; and

important information reconstructing means for reconstructing important information from header information output from said decoder means, and informing said decoder means of the important information.

22. A video coding apparatus according to claim 22, further comprising:

means for reconstructing conventional picture relating important information from the header

information;

arbitrary shape coding determination means for determining based on the header information whether a decoded picture is an arbitrary shape picture;

arbitrary shape picture relating important information constructing means for reconstructing arbitrary shape picture relating important information from the header information;

switch means for inputting the header information to said arbitrary shape picture relating information reconstructing means when said arbitrary shape coding determination means determines that the decoded picture is an arbitrary shape picture; and

switch means for outputting the arbitrary shape picture relating important information when said arbitrary shape coding determination means determines that the decoded picture is an arbitrary shape picture.

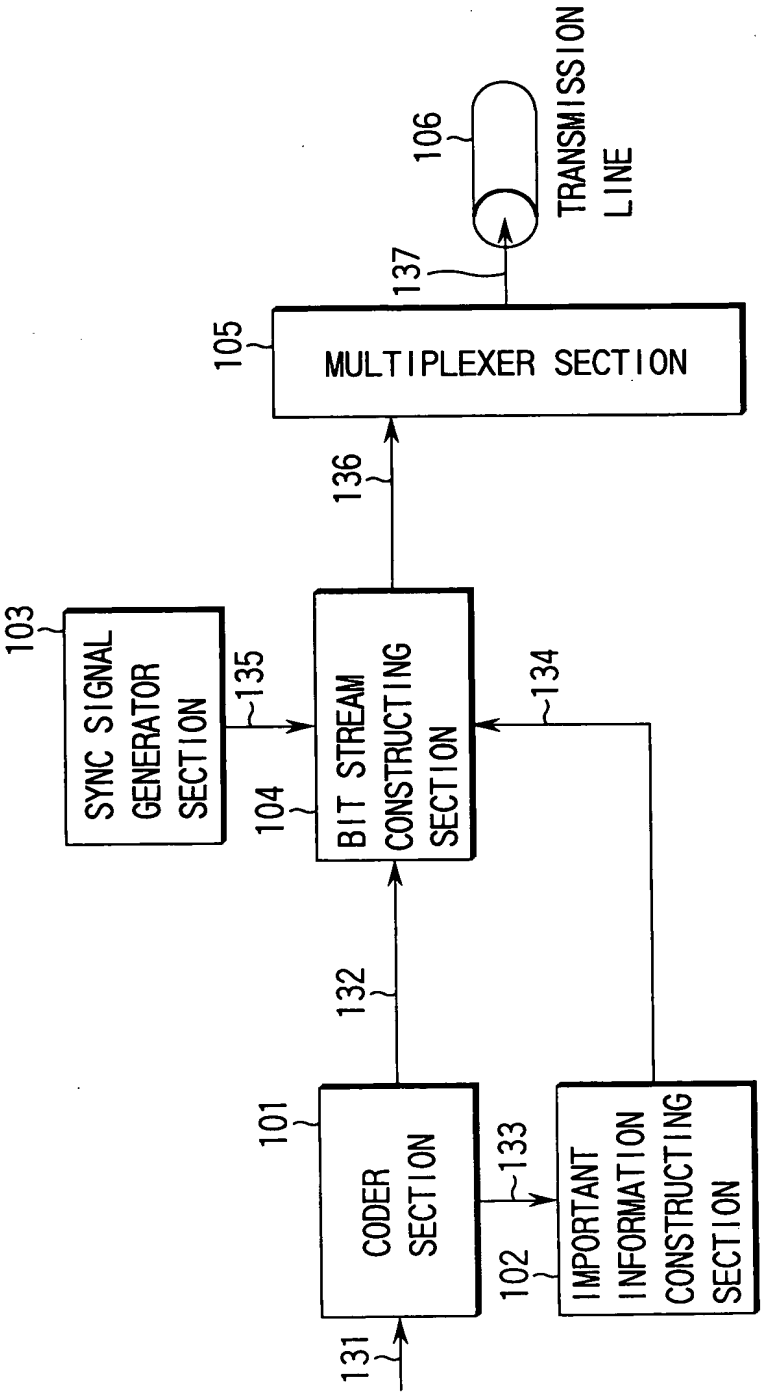
TRANSMISSION LINE
106
137
105
MULTIPLEXER SECTION
136
103
SYNC SIGNAL GENERATOR SECTION
135
104
BIT STREAM CONSTRUCTING SECTION
134
132
101
CODER SECTION
133
102
IMPORTANT INFORMATION CONSTRUCTING SECTION
131

FIG. 1

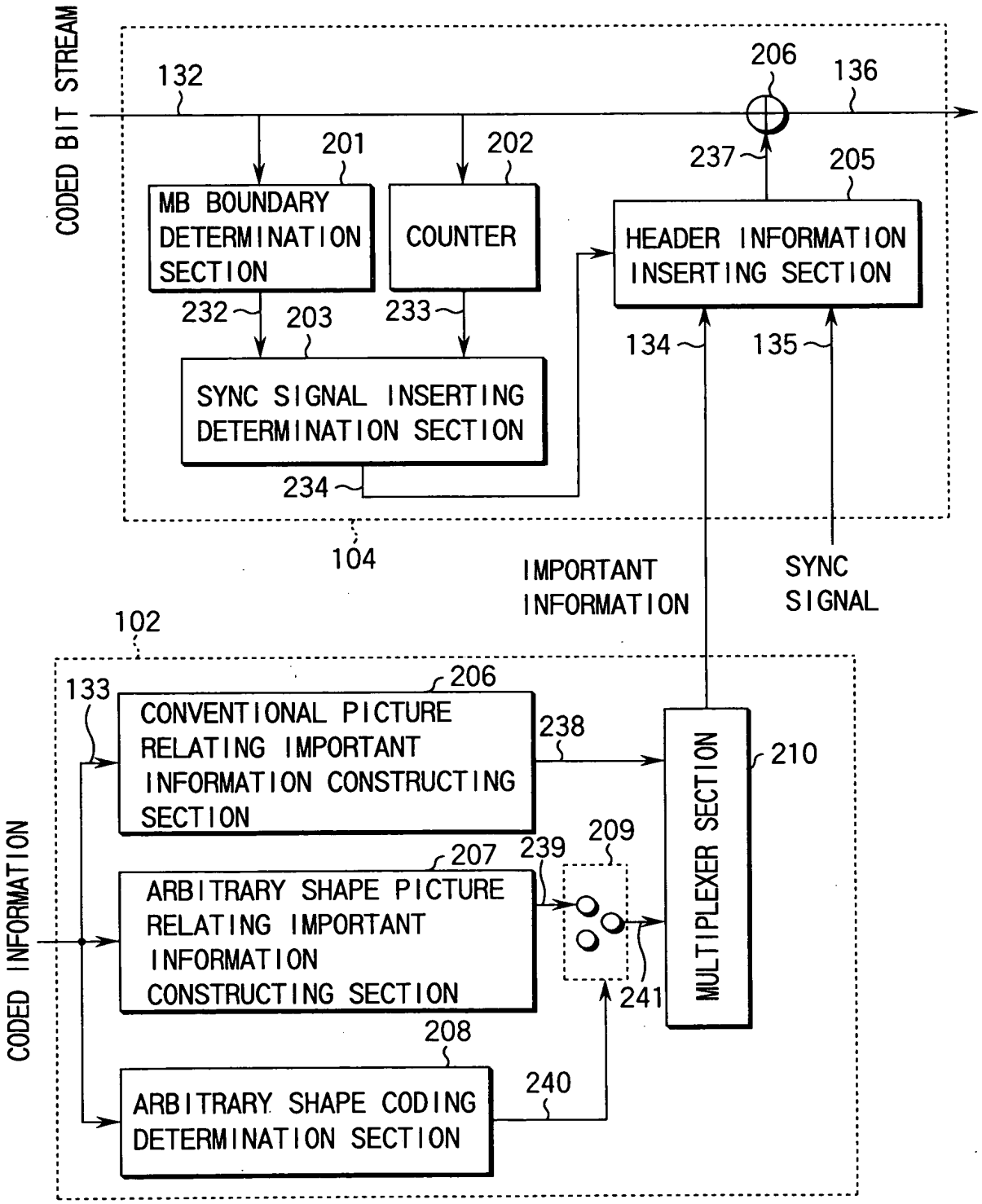
CODED BIT STREAM
132
206
136
201
202
237
205
MB BOUNDARY DETERMINATION SECTION
COUNTER
HEADER INFORMATION INSERTING SECTION
232
203
233
134
135
SYNC SIGNAL INSERTING DETERMINATION SECTION
234
104
IMPORTANT INFORMATION
SYNC SIGNAL
102
133
206
CONVENTIONAL PICTURE RELATING IMPORTANT INFORMATION CONSTRUCTING SECTION
238
210
MULTIPLEXER SECTION
209
239
207
ARBITRARY SHAPE PICTURE RELATING IMPORTANT INFORMATION CONSTRUCTING SECTION
241
CODED INFORMATION
208
240
ARBITRARY SHAPE CODING DETERMINATION SECTION

FIG. 2

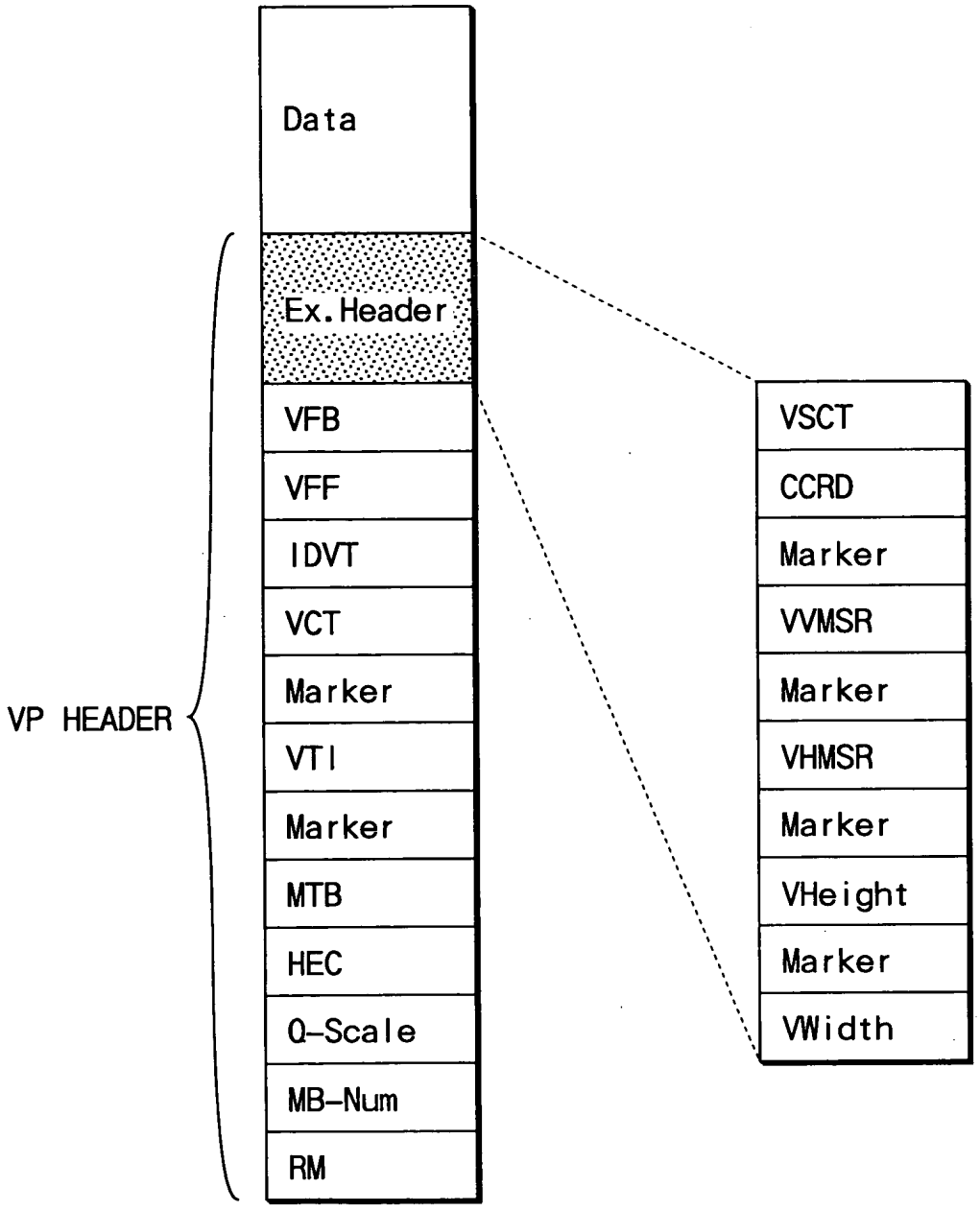
Data
Ex. Header
VFB
VFF
IDVT
VCT
Marker
VTI
Marker
MTB
HEC
Q-Scale
MB-Num
RM
VP HEADER
VSCT
CCRD
Marker
VVMSR
Marker
VHMSR
Marker
VHeight
Marker
VWidth

FIG. 4

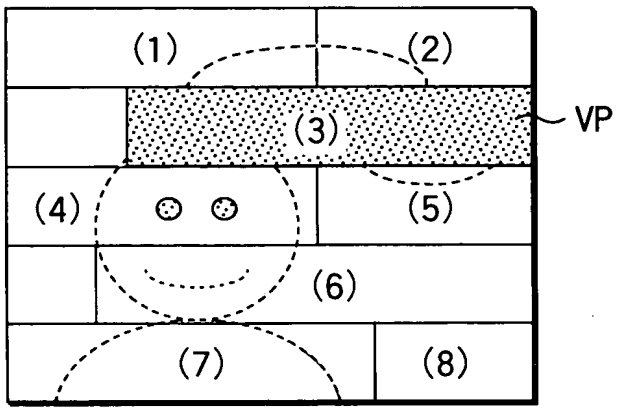
(1)
(2)
(3)
VP
(4)
(5)
(6)
(7)
(8)

FIG. 19

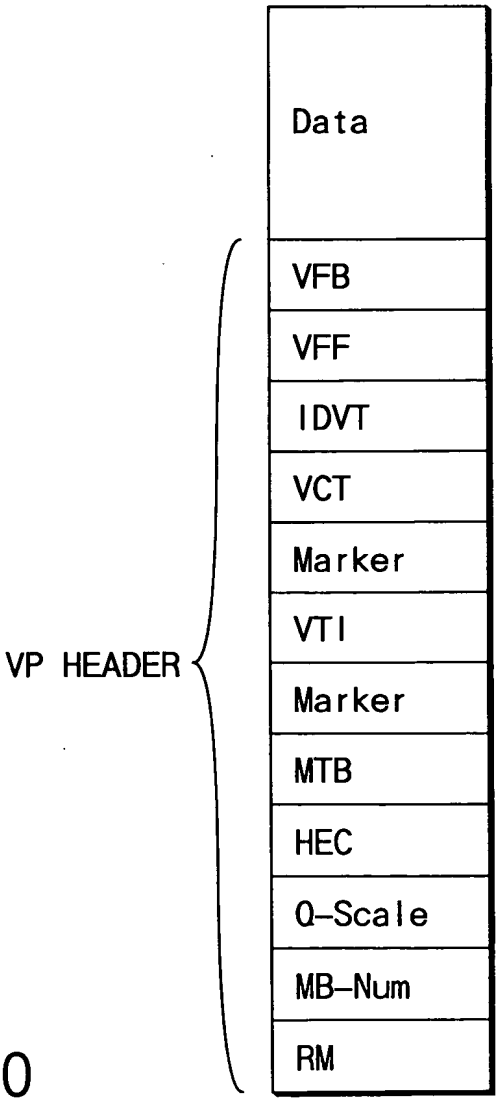
Data
VFB
VFF
IDVT
VCT
Marker
VTI
Marker
MTB
HEC
Q-Scale
MB-Num
RM
VP HEADER

FIG. 20

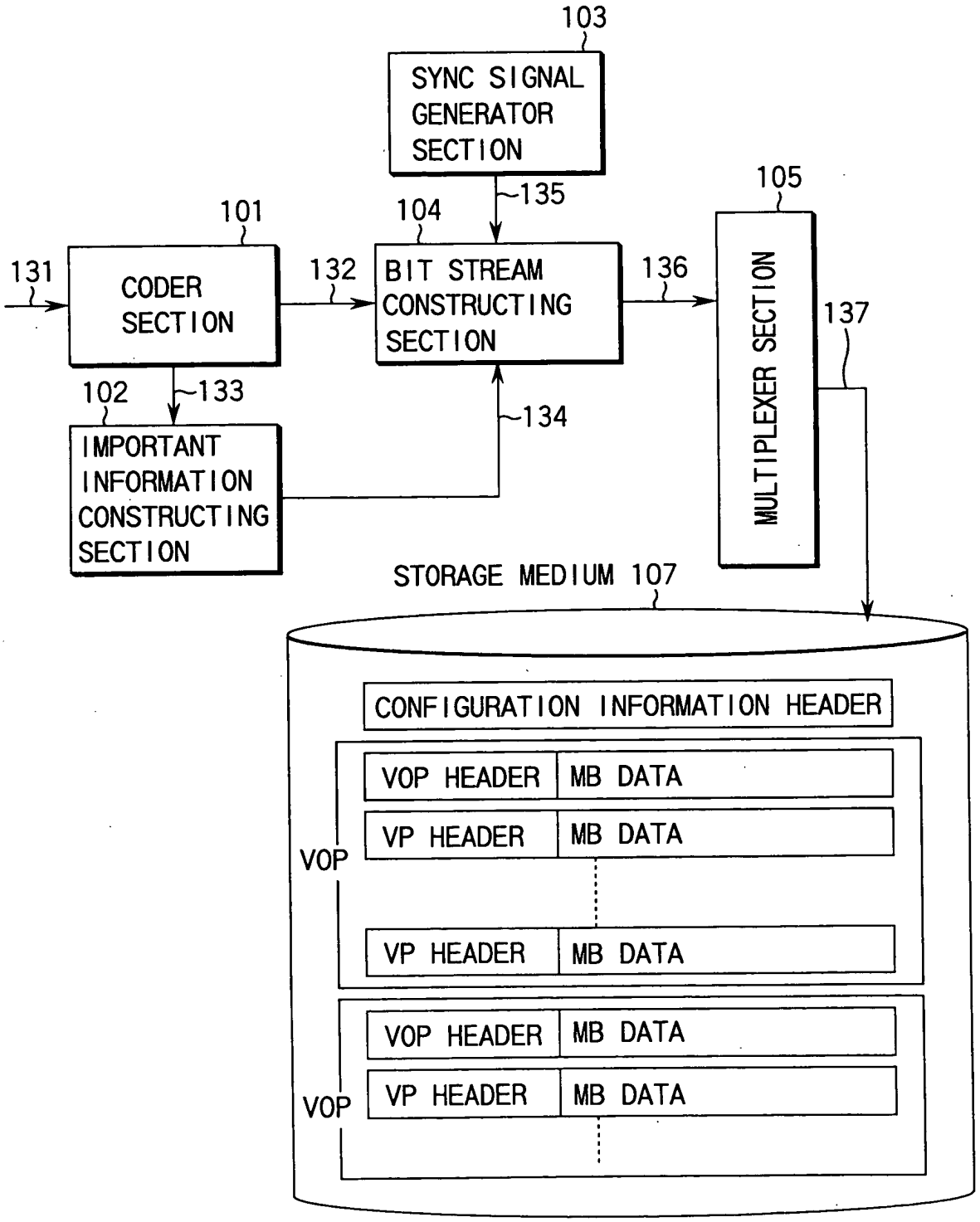
103
SYNC SIGNAL GENERATOR SECTION
135
105
101
104
131
CODER SECTION
132
BIT STREAM CONSTRUCTING SECTION
136
MULTIPLEXER SECTION
137
102
133
134
IMPORTANT INFORMATION CONSTRUCTING SECTION
STORAGE MEDIUM 107
CONFIGURATION INFORMATION HEADER
VOP HEADER
MB DATA
VP HEADER
MB DATA
VOP
VP HEADER
MB DATA
VOP HEADER
MB DATA
VP HEADER
MB DATA
VOP

FIG. 26

6T

Translation
09/914767

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 99S1109P	**FOR FURTHER ACTION**	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/JP00/01354	International filing date (*day/month/year*) 06 March 2000 (06.03.00)	Priority date (*day/month/year*) 05 March 1999 (05.03.99)
International Patent Classification (IPC) or national classification and IPC H04N 7/64		
Applicant KABUSHIKI KAISHA TOSHIBA		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 3 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 49 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 17 August 2000 (17.08.00)	Date of completion of this report 15 May 2001 (15.05.2001)
Name and mailing address of the IPEA/JP Facsimile No.	Authorized officer Telephone No.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/JP00/01354

I. Basis of the report

1. With regard to the **elements** of the international application:*

☐ the international application as originally filed

☒ the description:

pages 1,2,6,7,9,18,32-40,42-51, as originally filed

pages _____, filed with the demand

pages 3-5,8,10-17,19-31,41, filed with the letter of 15 January 2001 (15.01.2001)

☒ the claims:

pages 4,9,19,20, as originally filed

pages _____, as amended (together with any statement under Article 19

pages _____, filed with the demand

pages 1,2,7,8,11,17,21-24,27-47, filed with the letter of 15 January 2001 (15.01.2001)

☒ the drawings:

pages 3,5-18,21-25,27-30, as originally filed

pages _____, filed with the demand

pages 1,2,4,19,20,26, filed with the letter of 15 January 2001 (15.01.2001)

☐ the sequence listing part of the description:

pages _____, as originally filed

pages _____, filed with the demand

pages _____, filed with the letter of _____

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language _____ which is:

☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).

☐ the language of publication of the international application (under Rule 48.3(b)).

☐ the language of the translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☒ The amendments have resulted in the cancellation of:

☐ the description, pages _____

☒ the claims, Nos. 3,5,6,10,12-16,18,25,26

☐ the drawings, sheets/fig _____

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* *Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rule 70.16 and 70.17).*

** *Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.*

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/JP00/01354

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1,2,4,7-9,11,17,19-24,27-47	YES
	Claims		NO
Inventive step (IS)	Claims	1,2,4,7-9,11,17,19-24,27-47	YES
	Claims		NO
Industrial applicability (IA)	Claims	1,2,4,7-9,11,17,19-24,27-47	YES
	Claims		NO

2. Citations and explanations

Document 1: All About MPEG-4 (SUKEICHI MIKI, ED.), Kogyo Chosakai Corporation, September 30 1998 (30.09.98)
Document 2: JP, 10-336746, A (MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.), (18.12.98)
Document 3: JP, 64-13838, A (NEC CORPORATION) (18.01.89)
Document 4: JP, 11-55665, A (SAMSUNG ELECTRON CO., LTD.) (20.01.99)
Document 5: JP, 6-326967, A (MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.) (25.11.94)
Documents 2-5 are cited in the ISR.

Concerning Claims 1, 4, 7, 9, 11, 19, 20, 35, 36, 39, 40
Adding significant information and a synchronization signal to an image signal bit stream in MPEG-4 is a well-known technique (see for example cited document 1, pages 101-114).
Also, in ordinary data transmission the technique of duplicating and sending high-significance data as an anti-error measure is well-known, as seen in the aforesaid documents 2 and 3, etc. for example.

Concerning Claims 2, 8, 22, 29, 46
A technique for coding that switches between optional-format encoding and directional coding to make coding more efficient is disclosed in the aforesaid document 4.

Concerning Claim 21
A technique for inserting a synchronization signal for each specified data unit is well-known, as seen in the aforesaid document 5, etc. for example.

Concerning Claims 17, 43
Sending and receiving coding information between a server computer and a client computer is a common technique.

Concerning Claims 23, 24, 27, 28, 37, 41, 44
In a moving picture image coding device, sending and receiving information indicating image size and image position is a common technique.

Concerning Claims 30-34, 38, 42, 45, 47
Transmission information bit length is merely something to be suitably decided by a person skilled in the art based on experiments, etc.

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09/914787

特　許　協　力　条　約

PCT

国際予備審査報告

（法第１２条、法施行規則第56条）
〔ＰＣＴ３６条及びＰＣＴ規則70〕

出願人又は代理人の書類記号　９９Ｓ１１０９Ｐ	今後の手続きについては、国際予備審査報告の送付通知（様式ＰＣＴ／ＩＰＥＡ／４１６）を参照すること。	
国際出願番号 ＰＣＴ／ＪＰ００／０１３５４	国際出願日（日.月.年）　０６．０３．００	優先日（日.月.年）　０５．０３．９９
国際特許分類（ＩＰＣ） Int.Cl 7　H04N7/64		
出願人（氏名又は名称） 株式会社東芝		

１．　国際予備審査機関が作成したこの国際予備審査報告を法施行規則第57条（ＰＣＴ３６条）の規定に従い送付する。

２．　この国際予備審査報告は、この表紙を含めて全部で　3　ページからなる。

[X]　この国際予備審査報告には、附属書類、つまり補正されて、この報告の基礎とされた及び／又はこの国際予備審査機関に対してした訂正を含む明細書、請求の範囲及び／又は図面も添付されている。
（ＰＣＴ規則70.16及びＰＣＴ実施細則第６０７号参照）
この附属書類は、全部で　４９　ページである。

３．　この国際予備審査報告は、次の内容を含む。

I　[X]　国際予備審査報告の基礎

II　[ ]　優先権

III　[ ]　新規性、進歩性又は産業上の利用可能性についての国際予備審査報告の不作成

IV　[ ]　発明の単一性の欠如

V　[X]　ＰＣＴ３５条(2)に規定する新規性、進歩性又は産業上の利用可能性についての見解、それを裏付けるための文献及び説明

VI　[ ]　ある種の引用文献

VII　[ ]　国際出願の不備

VIII　[ ]　国際出願に対する意見

国際予備審査の請求書を受理した日　１７．０８．００	国際予備審査報告を作成した日　１５．０５．０１
名称及びあて先 日本国特許庁（ＩＰＥＡ／ＪＰ） 郵便番号１００－８９１５ 東京都千代田区霞が関三丁目４番３号	特許庁審査官（権限のある職員）　坂東　博司　５Ｐ　４２３４ 電話番号　０３－３５８１－１１０１　内線　４２３４

様式ＰＣＴ／ＩＰＥＡ／４０９（表紙）（１９９８年７月）

国際予備審査報告

国際出願番号　ＰＣＴ／ＪＰ００／０１３５４

Ⅰ．　国際予備審査報告の基礎

1．　この国際予備審査報告は下記の出願書類に基づいて作成された。（法第６条（ＰＣＴ１４条）の規定に基づく命令に応答するために提出された差し替え用紙は、この報告書において「出願時」とし、本報告書には添付しない。ＰＣＴ規則70.16, 70.17）

☐ 出願時の国際出願書類

☒ 明細書　第 1, 2, 6, 7, 9, 18, 32-40, 42-51 ページ、　出願時に提出されたもの
明細書　第 ＿＿＿＿＿＿＿＿ ページ、　国際予備審査の請求書と共に提出されたもの
明細書　第 3-5, 8, 10-17, 19-31, 41 ページ、　15.01.01 付の書簡と共に提出されたもの

☒ 請求の範囲　第 4, 9, 19, 20 項、　出願時に提出されたもの
請求の範囲　第 ＿＿＿＿＿＿＿＿ 項、　ＰＣＴ１９条の規定に基づき補正されたもの
請求の範囲　第 ＿＿＿＿＿＿＿＿ 項、　国際予備審査の請求書と共に提出されたもの
請求の範囲　第 1, 2, 7, 8, 11, 17, 21-24, 27-47 項、　15.01.01 付の書簡と共に提出されたもの

☒ 図面　第 3, 5-18, 21-25, 27-30 ~~ページ~~／図、　出願時に提出されたもの
図面　第 ＿＿＿＿＿＿＿＿ ページ／図、　国際予備審査の請求書と共に提出されたもの
図面　第 1, 2, 4, 19, 20, 26 ~~ページ~~／図、　15.01.01 付の書簡と共に提出されたもの

☐ 明細書の配列表の部分　第 ＿＿＿＿＿＿＿＿ ページ、　出願時に提出されたもの
明細書の配列表の部分　第 ＿＿＿＿＿＿＿＿ ページ、　国際予備審査の請求書と共に提出されたもの
明細書の配列表の部分　第 ＿＿＿＿＿＿＿＿ ページ、　＿＿＿＿＿＿＿＿ 付の書簡と共に提出されたもの

2．　上記の出願書類の言語は、下記に示す場合を除くほか、この国際出願の言語である。

上記の書類は、下記の言語である ＿＿＿＿＿＿＿＿ 語である。

☐ 国際調査のために提出されたＰＣＴ規則23.1(b)にいう翻訳文の言語
☐ ＰＣＴ規則48.3(b)にいう国際公開の言語
☐ 国際予備審査のために提出されたＰＣＴ規則55.2または55.3にいう翻訳文の言語

3．　この国際出願は、ヌクレオチド又はアミノ酸配列を含んでおり、次の配列表に基づき国際予備審査報告を行った。

☐ この国際出願に含まれる書面による配列表
☐ この国際出願と共に提出されたフレキシブルディスクによる配列表
☐ 出願後に、この国際予備審査（または調査）機関に提出された書面による配列表
☐ 出願後に、この国際予備審査（または調査）機関に提出されたフレキシブルディスクによる配列表
☐ 出願後に提出した書面による配列表が出願時における国際出願の開示の範囲を超える事項を含まない旨の陳述書の提出があった
☐ 書面による配列表に記載した配列とフレキシブルディスクによる配列表に記録した配列が同一である旨の陳述書の提出があった。

4．　補正により、下記の書類が削除された。
☐ 明細書　第 ＿＿＿＿＿＿＿＿ ページ
☒ 請求の範囲　第 3, 5, 6, 10, 12-16, 18, 25, 26 項
☐ 図面　図面の第 ＿＿＿＿＿＿＿＿ ページ／図

5．☐ この国際予備審査報告は、補充欄に示したように、補正が出願時における開示の範囲を越えてされたものと認められるので、その補正がされなかったものとして作成した。（ＰＣＴ規則70.2(c)　この補正を含む差し替え用紙は上記１．における判断の際に考慮しなければならず、本報告に添付する。）

国際予備審査報告

国際出願番号　ＰＣＴ／ＪＰ００／０１３５４

Ｖ．　新規性、進歩性又は産業上の利用可能性についての法第１２条（ＰＣＴ３５条(2)）に定める見解、それを裏付ける文献及び説明

１．　見解

新規性（Ｎ）　請求の範囲　1, 2, 4, 7-9, 11, 17, 19-24, 27-47　有
請求の範囲　　無

進歩性（ＩＳ）　請求の範囲　1, 2, 4, 7-9, 11, 17, 19-24, 27-47　有
請求の範囲　　無

産業上の利用可能性（ＩＡ）　請求の範囲　1, 2, 4, 7-9, 11, 17, 19-24, 27-47　有
請求の範囲　　無

２．　文献及び説明（ＰＣＴ規則70.7）

文献１：三木　弼一編著「ＭＰＥＧ－４のすべて」（株）工業調査会
　　１９９８年９月３０日発行
文献２：ＪＰ，１０－３３６７４６，Ａ(松下電器産業株式会社)(１８．１２．９８)
文献３：ＪＰ，６４－１３８３８，Ａ（日本電気株式会社）（１８．０１．８９）
文献４：ＪＰ，１１－５５６６５，Ａ（三星電子株式会社）（２０．０１．９９）
文献５：ＪＰ，６－３２６９６７，Ａ（松下電器産業株式会社)(２５．１１．９４)
　（文献２－５は、国際調査報告において引用されたものである。）

請求項１、４、７、９、１１、１９、２０、３５、３６、３９、４０に対して：
　ＭＰＥＧ－４において、画像信号ビット列に重要情報、同期信号（例えば引用文献１、第１０１～１１４頁等参照。）を加えることは、周知技術である。
　また、一般にデータ伝送において、エラー対策のために重要度の高いデータを２重化して伝送する技術は、例えば上記引用文献２，３等に示されるように周知である。

請求項２、８、２２、２９、４６に対して：
　効率よく符号化すべく、任意形状符号化と方形領域単位の符号化を切替て符号化する技術は、上記引用文献４に示されている。

請求項２１に対して：：
　同期信号を所定データ単位毎に挿入する技術は、例えば上記引用文献５等に示されるように周知技術である。

請求項１７、４３に対して：
　サーバコンピュータとクライアントコンピュータ間で符号化情報を送受信することは普通の技術である。

請求項２３、２４、２７、２８、３７、４１、４４に対して：
　動画像符号化装置において、画像サイズ及び画像位置を示す情報を送受信することは普通の技術である。

請求項３０－３４、３８、４２、４５、４７に対して：
　伝送する情報のビット長は実験等により最適なものを当業者が適宜みいだして用いればよい程度のものにすぎない。

等）、そのフレームを表示するタイミングを示すタイム・レファランス情報、あるいは量子化を行う際のステップサイズ情報などである。

従って、これらのヘッダ情報が失われてしまうと、それ以後に伝送されてきた画像情報が正しく復号できないことになる。

例えば前記フレームの予測タイプが、本来はフレーム間の符号化であることを示していたにも関わらず、何らかの原因でビット列に誤りが混入し、フレーム内の符号化を示すビットパターンに変化したとする。この場合、その後の実際の情報が正しく伝送されてきたとしても、復号側がビットパターンをフレーム内符号化として決定するので復号側は最後に順次伝送される情報を正常に符号化できない。

よって、動画像符号化装置における再生動画像の品質が大きく劣化してしまうことになる。

このような誤りの混入は、特に無線テレビ電話や携帯情報端末、無線ディジタルテレビ受信装置等のように無線伝送路を介して動画像を伝送／蓄積するシステムを用いた場合に多発する。

従来の画像伝送は、有線通信網を用いたシステムが主流であり、仮に無線通信網を用いる場合でも誤り率が非常に少ない衛星通信を想定していた。この前提で、伝送する符号化画像列の構造自体についての誤り耐性については十分な考慮がなされておらず、ヘッダ情報等の重要情報に対する伝送誤り保護が十分ではなかった。

一方、今後の移動体通信の主流の一つになるとなると見ら

れるＰＨＳ（簡易型携帯電話(Portable Handyphone System)）では誤り率が衛星通信の十万倍～百万倍程度になるため、従来のように符号化されたビット列に誤り保護または訂正を施しただけでは十分な訂正が不可能な状態になる。

また、ＰＨＳと同様に今後の通信の主流になると予想されるインターネットでは、いつ、どのような誤りが混入するかが統計的に明らかになっておらず、適切な誤り訂正が行えない場合もある。

それ故、任意形状の画像符号化を用いて符号化された符号列を伝送する場合に、伝送データの誤り耐性が弱くなってしまうという問題点があった。

本発明により、任意形状画像符号化の場合でも従来の長方形画像の符号化と同等の誤り耐性を持たせることが可能となる。

発明の開示

第１の発明は、入力された動画像を符号化してビット列を生成する符号化部と、この符号化部により得られる符号化情報から一定のビット列の纏まりがどのような規則のもとに符号化されているかを指し示す情報としての重要情報を取り出して構成する重要情報構成部と、同期コードを発生する同期

コード発生部と、前記符号化部により符号化されたビット列に前記同期発生部から出力された同期コードと前記重要情報構成部により再構成された重要情報を加えビット列を再構成するビット列再構成部とを有する動画像符号化装置を提供する。

第２の発明は、第１の発明における重要情報構成部が符号化情報からフレームを方形領域単位で符号化する通常の符号化方式における重要情報である通常画像関連情報を構成する通常画像関連重要情報構成部と、符号化情報からフレーム内の画像を任意形状画像領域単位で符号化する任意形状符号化方式における重要情報である任意形状画像関連重要情報を構成する任意形状画像関連重要情報構成部と、符号化情報から符号化している画像が任意形状画像であるか否かを判定する任意形状符号化判定部と、この任意形状符号化判定部が任意形状画像と判定した場合に任意形状画像関連重要情報を出力する切替部と、通常画像関連情報と切替部の出力とを多重化する多重化部とから構成されている画像符号化装置を提供する。

第３の発明は、動画像を符号化して同期情報を含むビット列を得ると共に、この符号化における一定のビット列の纏まりがどのような規則のもとに符号化されたかを指し示す情報としての重要情報をヘッダ情報として付加したビット列を含む符号化データを復号する復号化装置であって、入力されたビット列から画像ビット列を分離する分離部と、画像ビット列を復号する復号化部と、画像ビット列から同期コードを検出し復号化部へ通知する同期コード検出部と、復号化部の復号情

ヘッダ情報から任意形状画像関連重要情報を構成する任意形状画像関連重要情報構成部と、パケットヘッダ情報から拡張ヘッダがパケットヘッダに付加されているかどうか判定する拡張ヘッダ挿入判定部と、拡張ヘッダ挿入判定部で拡張ヘッダが挿入されていると判定された場合にパケットヘッダ情報を任意形状画像関連重要情報に入力する切替部とから構成されている画像復号化装置を提供する。

本発明は、動画像符号化において、符号化したデータにはヘッダを設けると共に、ヘッダには更に拡張ヘッダ部分を設けてヘッダに格納する通常の画像符号化方式における重要情報の他、当該拡張ヘッダに、任意形状画像符号化方式における重要情報も含めることができるので、ヘッダが一部壊れていても、健全なヘッダを持つ部分については画像を復号可能になる。また、画像データには同期コードを挿入しておくことにより、ビデオ・パケットＶＰの同期外れの問題も解消する。すなわち、ビデオ・パケットＶＰは同期コードＲＭで始まるパケットであり、それ以前に誤りが存在し、同期外れが生じた場合でもこの同期コードＲＭで再同期をすることが可能である。

これらのことから、伝送時での雑音に対する耐性の高い、また、任意形状画像符号化の場合でも従来の長方形画像の符号化と同等の誤り耐性を持たせることができる動画像符号化技術が提供できる。

図面の簡単な説明

図１は、本発明の第１の実施形態における符号化部の基本的構成を示す図。

要情報構成部の詳細な構成を示す図。

図１６は、任意形状画像の符号化を説明した図。

図１７は、任意形状画像の復号化を説明した図。

図１８は、ＭＰＥＧ－４のＶＯＰ構造を示した図。

図１９は、ＭＰＥＧ－４のＶＰ構造を示した図。

図２０は、ＭＰＥＧ－４のＶＰヘッダフォーマットを示した図。

図２１Ａおよび２１Ｂは、通常のＶＰの問題点を示した図。

図２２Ａおよび２２Ｂは、通常のＶＰの効果を示した図。

図２３Ａおよび２３Ｂは、ＨＥＣを用いた場合のＶＰの効果を示した図。

図２４は、任意形状画像の復号時に画像を合成して再生する場合の必要情報を示した図。

図２５は、本発明の第３に実施例に係る符号化/復号化装置が適用される無線動画像伝送システムの例を示す図。

図２６は、第１の実施形態の符号化装置に対応した第４の実施形態の符号化装置を示す図。

図２７は、第１の実施形態の復号化装置に対応する第４の実施形態の復号化装置を示す図。

図２８は、第２の実施形態の符号化装置に対応した第５の実施形態の復号化装置を示す図。

図２９は、第２の実施形態の復号化装置に対応する第５の実施形態の復号化装置を示す図。

図３０は、第３の実施形態の復号化装置のフローチャートを示す図。

発明を実施するための最良の形態

以下、図面を参照して本発明の実施例を説明する。

図１は、本発明の第１の実施形態に係る動画像符号化装置の基本構成を示す。これによると、符号化部１０１の出力は、重要情報構成部１０２およびビット列再構成部１０４に接続される。重要情報構成部１０２の出力は同期コード発生部１０３の出力と共にビット列再構成部１０４に接続される。ビット列再構成部１０４の出力は多重化部１０５に接続される。多重化部１０５の出力は伝送路１０６に接続される。

符号化部１０１は、入力された画像信号１３１を符号化してビット列再構成部１０４に出力し、また、符号化した際の符号化情報１３３を重要情報構成部１０２に出力するよう構成される。重要情報構成部１０２は符号化部１０１で符号化した際の符号化情報１３３を受けて復号に必要な重要情報１３４を選択して出力するように構成される。

同期コード発生部１０３は、任意の間隔で同期コード１３５を発生する部であり、ビット列再構成部１０４は、同期コード発生部１０３からの同期コード１３５をビット列１３２に挿入し、その後ろに、必要であれば重要情報構成部１０２から出力された重要情報１３４を、決められたフォーマットで挿入して出力するように構成される。

多重化部１０５は、ビット列再構成部１０４で再構成されたビット列１３６を、他のデータ（例えば音声データ、他の物体を符号化したビット列等）と共に多重化処理をして多重

化ビット列１３７として伝送路／蓄積媒体１０６に出力するように構成される。

上記のような構成において、入力された動画像の画像信号１３１は符号化部１０１で符号化される。この符号化部１０１により符号化されて出力されたビット列１３２はビット列再構成部１０４に入力される。また、符号化部１０１で符号化した際の符号化情報１３３は重要情報構成部１０２に入力され、復号に必要な重要情報１３４だけが選択され出力される。

ビット列再構成部１０４では、任意の間隔で同期コード発生部１０３から出力された同期コード１３５をビット列１３２に挿入し、その後ろに、必要であれば重要情報構成部１０２から出力された重要情報１３４を決められたフォーマットで挿入する。

ビット列再構成部１０４で再構成されたビット列１３６は多重化部１０５に入力され、他のデータ（例えば音声データ、他の物体を符号化したビット列等）と共に多重化処理が行われ、多重化ビット列１３７が伝送路／蓄積媒体１０６に出力される。

このように、本実施例では、動画像を符号化して得たビット列に、任意の間隔で同期コード発生部１０３から出力された同期コード１３５が挿入され、その後ろに、必要であれば重要情報構成部１０２から出力された重要情報１３４が決められたフォーマットに従ってビット列再構成部１０４により挿入される。

そのため、ＭＰＥＧ－４における任意形状の画像符号化・復号化に必要な情報、例えば、任意形状の画像符号化では画像サイズの幅ＶＷの情報と高さＶＨの情報および復号した画像を表示する位置を示すための画像位置のｘ座標ＶＨＭＳＲの情報、ｙ座標ＶＶＭＳＲの情報、そして、形状情報の符号化モードを示すＶＯＰシェープ・コーディング・タイプ“vop_shape_coding_type（ＶＳＣＴ）”や、形状情報のサイズを変換してから符号化するかどうかを示すフラグであるchange_conv_ratio_disable（ＣＣＲＤ）などが重要情報１３４として生成される。この重要情報が決められたフォーマットでビット列再構成部１０４により二重化してＶＰヘッダに挿入されると、任意形状画像符号化にも長方形画像の符号化と同等の誤り耐性を持たせることができるようになり、ＶＯＰヘッダやＶＰが一部壊れていても動画像の復号化が可能になる。

ＭＰＥＧ－４の場合、フレームに相当するものをビデオ・オブジェクト・プレーン“ Video Object Plane ”と呼ぶ（図１８）。さらにこの Video Object Plane（以下、これをＶＯＰと呼ぶ）を複数のパケットに分割することが可能であり、これをビデオ・パケット“ Video Packet ”と呼ぶ（図１９）。

ビデオ・パケット“Video Packet”（以下、これをＶＰと呼ぶ）は同期コード（Resync Marker、以下、ＲＭと呼ぶ）で始まるパケットであり、それ以前に誤りが存在し、同期外れが生じた場合でもこの同期コードで再同期をすることは可能であ

った。

従って、先頭以外のビデオ・パケットＶＰであれば、誤りにより情報が破壊／消失したとしても、その後のビデオ・パケットＶＰは正しく復号することができる。それはビデオ・オブジェクト・プレーンＶＯＰの先頭のＶＯＰヘッダが復号出来ていて、復号に必要な情報が全て揃うことからである（図２０）。

ＶＯＰヘッダ情報には前述したようにビデオ・オブジェクト・プレーンＶＯＰの符号化タイプ（フレーム内符号化、フレーム間符号化等）、タイム・レファランス、ステップサイズ等が含まれている。この情報を失うと、全てのビデオ・パケットＶＰの復号が出来なかった（図２１Ａ，２１Ｂ）。

図２２Ａ、２２Ｂの例の場合、ビデオ・オブジェクト・プレーンＶＯＰのヘッダとそれのペアとなるデータは壊れていないが、第１のビデオ・パケットＶＰのヘッダとそれのペアとなるデータだけ壊れている様子を示している。この場合、図２２Ｂに示すように、ビデオ・オブジェクト・プレーンＶＯＰとそれのデータ部分は壊れていないので画像の第１の領域は正常に復号され、次の第２の領域は誤りが生じて劣化のある画像が復号され、次の第３の領域以降は正常に復号されるので、部分的には壊れているが、殆どが綺麗に再生された画像として復号できた。

ＭＰＥＧ－４では図２１Ａ，２１Ｂの場合でも画像全体が復号不可能にならないようにビデオ・パケットＶＰのヘッダの中にヘッダ・エクステンション・コードＨＥＣを定義し、その後にＶＯＰヘッダの中の重要な情報をＨＥＣ情報に従って記述することが可能になっていた。

その結果、図２３Ａのように、ＶＯＰの先頭に何らかの誤りが存在し、復号できなかった場合でも、ＨＥＣで保護された情報を利用することで、先頭を領域の画像は正常に復元できなくとも、第２の領域以降の部分のビデオ・パケットＶＰを復号することが可能になり、図２３Ｂに示すように部分的には壊れているが、殆どが綺麗に再生された画像として復号できることになる。

しかしながら、これはあくまでも長方形の画像領域単位で実現できるに過ぎなかった。つまり、ＶＯＰヘッダ情報をＶＰヘッダの中にＨＥＣを用いて二重化することで、ＶＯＰヘッダが失われた場合でも、ＶＰヘッダの中にＨＥＣによってＶＯＰヘッダが二重化されていれば、それを利用することでその後のデータを正しく復号することが可能であるが、ＨＥＣを用いて二重化できる情報中には、任意形状の画像符号化の際に必要になる情報が含まれていない。そのため、従来の長方形の画像であれば問題がなかったものの、ＭＰＥＧ－４のように、オブジェクト単位で任意形状の画像を符号化できるようにした方式の場合、復号化できなかった。

これはＭＰＥＧ－４におけるオブジェクト単位での任意形状の画像の符号化には、長方形の画像の符号化に比べて更に多くのヘッダ情報が追加されていることから、これを二重化の対象とできないことが大きな問題であった。

また、別の観点からみてみる。インターネットやイントラネット等の利用が一般化してくると、このようなネットワークを利用しての通信が多くなり、インターネットテレビ電話等も利用されるようになっている。この場合、動画像をリアルタイムで伝送することになる。しかしながら、動画像をインターネットやイントラネット等でリアルタイムに伝送しようとすると、一般に用いられているＴＣＰやＵＤＰのプロトコルでは問題点が多い。特に、ヘッダが時間情報を持っていない点が問題であった。

そこで、近年、動画像／音声データの伝送に利用されるプロトコルとしてＲＴＰ(Real-time Transfer Protocol)が注目を浴びている。すなわち、ＴＣＰなどのプロトコルの場合、パケット毎に付属する時間情報がないため、受信側ではその受信したデータをいつ再生すればいいのかを知ることができなかった。そのため、データをパケット伝送した場合に、受信側ではそのデータが動画像データや音声・サウンドデータである場合には旨く再生することができなかった。

しかし、ＲＴＰではパケット毎に時間情報を付加し、受信側でそれを元に動画像データや音声・サウンドデータを再生することが可能となる。このように、ＲＴＰはリアルタイムデータの伝送に適したプロトコルとなっている。

このプロトコルには、各アプリケーション毎に拡張ヘッダを定義できるようになっている。
ＭＰＥＧ－４ではＶＯＰヘッダ情報をＶＰヘッダの中にＨＥＣを用いて二重化することで、

しく復号することができなかった。

また、形状情報の符号化モードを示すＶＯＰシェープ・コーディング・タイプ“vop_shape_coding_type（以下、ＶＳＣＴと呼ぶ）”や、形状情報のサイズを 変換してから符号化するかどうかを示すフラグである change_conv_ratio_disable（以下、ＣＣＲＤと呼ぶ）なども正しく復号するためには必要である。

ＭＰＥＧ－４のＨＥＣによるＶＯＰヘッダの二重化は、これらの情報を保護していない。

それ故、任意形状の画像符号化を用いて符号化された符号列を伝送する場合に、伝送データの誤り耐性が弱くなってしまう問題点があった。

本発明により、任意形状画像符号化の場合でも従来の長方形画像の符号化と同等の誤り耐性を持たせることが可能となる。

このように、本システムは、任意形状画像符号化の場合でも従来の長方形画像の符号化と同等の誤り耐性を持たせることができる。上記の構成において本発明の重要な構成である重要情報構成部１０２とビット列再構成部１０４を図２を参照して詳しく説明する。

まず、重要情報構成部１０２の詳細について説明する。

重要情報構成部１０２は図２に示すように、通常画像関連重要情報構成部２０６、任意形状画像関連重要情報構成部２０７、任意形状符号化判定部２０８、多重化部２１０とより構成される。

これらのうち、通常画像関連重要情報構成部２０６は、符号化部１０１からの符号化情報１３３を受けて、これより通常の符号化の際、重要と判断される情報（例えば符号化モード情報やタイム・レファランス情報等）を選択し、通常画像関連重要情報２３８として多重化部２１０に出力するよう構成される。任意形状画像関連重要情報構成部２０７は、任意形状画像符

号化に関連した重要情報（例えば、画像サイズ、位置、符号化モード、サイズ変換率等）を選択して、これを任意形状画像関連重要情報２３９として出力するよう構成される。

任意形状符号化判定部２０８は、符号化された画像が通常の長方形の画像であるのか任意形状の画像であるのかを判定する部であって、判定結果を判定コード２４０として出力する。

切替部２０９は、任意形状符号化判定部２０８からの判定信号２４０に応じて任意形状画像関連重要情報構成部２０７からの任意形状画像関連重要情報２３９を多重化部２１０に出力するかどうかの切替制御を行う。多重化部２１０は、通常画像関連重要情報構成部２０６からの通常画像関連重要情報２３８と、任意形状画像符号化において任意形状符号化判定部２０８から出力する任意形状画像関連重要情報２３９とを多重化し、重要情報１３４として出力するよう構成される。

上記のような構成において、符号化部１０１からの符号化情報１３３は、重要情報構成部１０２の構成要素である通常画像関連重要情報構成部２０６に入力され、当該通常画像関連重要情報構成部２０６において、通常の符号化の際、重要と判断される情報（例えば符号化モード情報やタイム・レファランス情報等）が選択されることによって、この選択された情報が通常画像関連重要情報２３８として多重化部２１０に出力される。従って、通常画像関連重要情報２３８には符号化モード情報やタイム・レファランス情報等のような通常

の符号化の際、重要と判断される情報が集められたものとなる。

次に、任意形状画像関連重要情報構成部２０７においては、

任意形状画像符号化に関連した重要情報（例えば、画像サイズ、位置、符号化モード、サイズ変換率等）が選択され、任意形状画像関連重要情報２３８として多重化部２１０に出力される。

一方、任意形状符号化判定部２０８では、符号化された画像が通常の長方形の画像であるのか、任意形状の画像であるのかを判定すると共に、その判定結果を判定コード２４０として出力する。この判定コード２４０により切替部２０９は制御されて、任意形状画像関連重要情報構成部２０７からの任意形状画像関連重要情報２３９を出力するかどうかの切替制御をする。

多重化部２１０では、通常画像関連重要情報２３８と任意形状画像符号化の場合は任意形状画像関連重要情報２３９とを多重化し、重要情報１３４として出力する。

この結果、任意形状画像符号化の場合は通常画像関連重要情報２３８と任意形状画像関連重要情報２３９とが多重化された重要情報１３４として多重化部２１０から出力できる。通常画像符号化の場合は、通常画像関連重要情報２３８が重要情報１３４として出力できることとなる。

次にビット列再構成部１０４の詳細について説明する。ビット列再構成部１０４は図２の上半分の領域に示したように、ＭＢ境界判定部２０１、カウンタ２０２、同期コード挿入判定部２０３、ヘッダ情報挿入部２０５、加算部２０４とより構成される。

これらのうち、ＭＢ境界判定部２０１は、

符号化部１０１からのビット列１３２のデータがマクロブロックＭＢの境界に当たるか否かを判定する。また、符号量カウンタ部２０２は、前段の符号化部１０１からのビット列１３２の符号量をカウントする。

同期コード挿入判定部２０３は、ＭＢ境界判定部２０１がビット列１３２についてＭＢ境界と判定し、しかも、当該ビット列１３２に対して符号量カウンタ部２０２のカウント値がある値を超えていた場合、挿入許可信号２３４を出力する。

また、ヘッダ情報挿入部２０５は、入力された重要情報１３４と同期コード１３５からヘッダ情報を作成し、同期コード挿入判定部２０３で挿入許可と判断された場合に、符号化されたビット列１３２に対して当該作成したヘッダ情報２３７を付加すべく加算部２０４に出力する。

また、加算部２０４は符号化部１０１からのビット列１３２とヘッダ情報挿入部２０５のヘッダ情報２３７とを加算し、この和をビット列再構成部１０４の再構成ビット列１３６として出力する。

ビット列再構成部１０４は、符号化部１０１で符号化されたビット列１３２を受けると、ビット列１３２がＭＢ境界判定部２０１と符号量カウンタ部２０２とに入力される。このＭＢ境界判定部２０１において入力ビット列１３２が、

ＭＢの境界である否かを判定する。

また、符号量カウンタ部２０２では、ビット列１３２の符号量をカウントする。同期コード挿入判定部２０３では、ＭＢ境界判定部２０１での判定がＭＢ境界と判定され、且つ、カウンタ２０２での符号量のカウント値が、ある値を超えていた場合に、挿入許可信号２３４を発生し、ヘッダ情報挿入部２０５に出力するように動作する。

一方、ヘッダ情報挿入部２０５は、入力された重要情報１３４と同期コード１３５からヘッダ情報を作成し、同期コード挿入判定部２０３で挿入許可と判断された場合に、符号化されたビット列１３２に作成したヘッダ情報２３７を付加するため加算部２０４に送る。これにより、加算部２０４は符号化されたビット列１３２にヘッダ情報２３７を挿入し、再構成されたビット列１３６を出力する。このビット列１３６がビット列再構成部１０４の出力となる。

この結果、符号化部１０１からの画像データのビット列１３２を調べて、マクロブロックＭＢの境界位置となるビットが到来した時点において、符号量が所定の値を超えていた場合に、挿入許可信号２３４が発生される。入力された重要情報１３４と同期コード１３５に基づいてヘッダ情報挿入部２０５において作成されたヘッダ情報が、上記ビット列１３２に付加できる。

重要情報構成部１０２は、通常画像関連重要情報構成部２０６が符号化部１０１からの符号化情報１３３に基づいた通常の符号化の際、重要と判断される情

報（例えば、符号化モード情報やタイム・レファランス情報等）を選び、それを通常画像関連重要情報２３８とする。また、任意形状画像関連重要情報構成部２０７は、任意形状画像符号化に関連した重要情報（例えば、画像サイズ、位置、符号化モード、サイズ変換率モード等）を選び、これを任意形状画像関連重要情報２３９とする。通常画像関連重要情報２３８は通常画像符号化のために使用される。通常画像関連重要情報２３８と任意形状画像関連重要情報２３９とが任意形状画像を符号化するときに多重化される。従って、ビット列に挿入するヘッダ情報には通常画像情報関連重要情報と任意形状画像関連重要情報を含ませることができ、ＭＰＥＧ－４の符号化データの通常画像と任意形状画像を再生するために必要な情報をＶＰヘッダに含ませることができる。

図３にヘッダ情報の作成に関するフローチャートを示す。

ビット列再構成部１０４では、まず第１段階（ステップＳ５０２）として、符号化部１０１からのビット列に対し、ＭＢ（マクロブロック）の境界位置かどうかの判定を行う。

第２段階（ステップＳ５０３）としては、ＭＢであった場合、同期コードＲＭを挿入すべきかどうかの判定を行う。この判定ステップは、ユーザの任意のアルゴリズムで行うことが可能である。

例えば、直前の同期コードから一定のビット数を超えたならば同期コードＲＭを挿入すると云ったアルゴリズムや、直前の

同期コードから一定のＭＢ数を越えた場合、画像の形状に沿って同期コードＲＭを挿入するかどうかの判断を行う他のアルゴリズムなど様々な方法が利用可能である。

ビデオ・パケットＶＰは同期コードＲＭで始まるパケットであり、それ以前に誤りが生じ、同期外れが生じた場合でもこの同期コードＲＭで再同期をすることが可能である。

ステップＳ５０３において同期コードＲＭを挿入すると判定された場合、ＲＭを挿入し、ＲＭに続くＶＰヘッダを挿入する（図３のステップＳ５０４）。

第３段階（ステップＳ５０５）は、ヘッダ拡張情報としてＶＯＰヘッダの重要情報を二重化するかどうかの判定を行う。

二重化すると判定された場合は、ＨＥＣを真にセットし、その後、ＶＯＰヘッダの中から長方形の画像符号化における重要情報を選択し、出力する（図３のステップＳ５０６）。

第４段階（ステップＳ５０７）では、任意形状画像か否かの判定を行う。任意形状画像の場合は、ＶＯＬヘッダ内の任意形状画像符号化における重要情報を選択し、出力する（図３のステップＳ５０８）。

以上の４つの段階を経てＶＰヘッダ部分を生成し、ビット列に挿入する。

図４に、任意形状画像のＶＰヘッダ情報の構成例を示す。図２０に示す従来のＶＰヘッダ情報に対し、ヘッダ拡張情報Ｅｘ－Ｈｅａｄｅｒが追加されており、このヘッダ拡張情報Ｅｘ－Ｈｅａｄｅｒには任意形状画像符号化における重要情報、すなわち、画像の幅（ＶＷ）、高さ（ＶＨ）、画像を貼

り込むＸ座標（ＶＨＭＳＲ）、Ｙ座標（ＶＶＭＳＲ）、形状情報を縮小しているかどうかを示すフラグ（ＣＣＲＤ）、形状情報の符号化タイプ（フレーム内符号化／フレーム間符号化等）の情報（ＶＳＣＴ）が含まれる。

尚、任意形状画像符号化における重要情報としては、上記情報に限定されるものではなく、アプリケーションの用途により、さらに他の情報を増やすことも、逆に情報を減らすことも可能である。但し、送信側、受信側でヘッダフォーマットに関して共通の認識が必要になる。

以上、任意形状画像符号化における重要情報の抽出機能と任意形状画像符号化を使用しているか否かの判定機能と、マクロブロックの境界検出機能を持たせる。ＶＰヘッダはヘッダ拡張情報を含む。このヘッダ拡張情報は同期コードに加えて通常の画像符号化における重要情報並びに任意形状画像符号化においては任意形状画像符号化における重要情報も含む。ヘッダが一部壊れていても、健全なヘッダを持つ部分については画像を復号可能になる。また、同期コードがあるのでビデオ・パケットＶＰの同期外れの問題も解消する。すなわち、ビデオ・パケットＶＰが同期外れを生じさせる誤りを有するとしても、ビデオパケットを含む同期コードＲＭで再同期をすることが可能である。

これらのことから、伝送時での雑音に対する耐性の高い、また、任意形状画像符号化の場合でも従来の長方形画像の符

号化と同等の誤り耐性を持たせることができるようになる動画像符号化技術を提供できる。

以上は、符号化側での構成と処理の詳細を説明したが、次に復号側の構成と処理の詳細を説明する。

復号部について説明する。図５に示される第１の実施形態にかかる復号部によると、符号化ビット列が入力される分離部３０２は、復号化部３０３および同期検出部３０４に接続される。同期検出部３０４の出力は復号化部３０３に接続される。復号化部３０３はエラーチェック部３０５に接続される。このエラーチェック部３０５は復号化部３０３と共に重要情報構成部３０６に接続される。重要情報構成部３０６は復号化部３０３に接続される。

分離部３０２は、伝送路／記憶媒体１０６から受信されたビット列３３１を画像用のビット列３３２とそれ以外のデータに分離するために設けられている。同期検出部３０４は分離部３０２から出力されるビット列３３２中から同期コードＲＭを検出する。また、復号化部３０３は、分離部３０２から出力される画像用ビット列３３２について復号化処理して画像データを生成する。その際、復号化部３０３は、同期コード検出部３０４により検出された同期コードに同期させながら復号処理を実施するように構成されている。

また、重要情報構成部３０６は、復号化部３０３の現在復号処理中のデータを得て、これより当該復号化部３０３において現在復号中のＶＯＰ（ビデオ・オブジェクト・プレー

ン）がＶＯＰヘッダ有している場合は、重要情報構成部３０６はＶＯＰヘッダの重要情報を抽出し、それを復号化部３０３に出力する。

エラーチェック部３０５は、復号化部３０３の出力する復号情報３３４をチェックして復号作業中に誤りが生じていないかを検出する部であり、誤りが検出された場合、エラーチェック部３０５は、重要情報構成部３０６に復号化処理に誤りを知らせて、重要情報の復号化部３０３への出力を抑止させるように構成されている。

復号化部３０３は誤りが発生した場合に、その誤りに対応した処理を行うように構成されている。また、復号化部３０３は、その誤りに対応した処理を行った後、同期検出部３０４が検出した次の同期コードの位置から再び復号作業を行う。

このような構成において、伝送路／記憶媒体１０６から受信されたビット列３３１は、分離部３０２により画像用のビット列３３２と、それ以外のデータに分離される。その他のデータは、夫々に対応した復号化部に送られる。

分離部３０２により分離された画像用ビット列３３２は、復号化部３０３に入力される。その際、同期コード検出部３０４により同期コードがビット列３３２中から検出されながら復号処理が行われる。

復号化部３０３で復号化処理されることによって得られる復号情報３３４からエラーチェック部３０５で復号作業中に誤りが生じていないかを検出する。誤りが検出された場合、誤りに対応した処理が復号化部３０３で行われた後、同期検出部３０４が検出した次の同期コードの位置から復号作業が行

われる。

復号化部３０３は次の同期コードの種類を判定し、同期コードＲＭの場合でエラー信号３３５が真の場合に、重要情報構成部３０６からＶＯＰヘッダの情報３４３を取得する。

重要情報構成部３０６は、復号化部３０３が現在復号中のＶＯＰ（ビデオ・オブジェクト・プレーン）にＶＯＰヘッダが存在している場合は、その情報を出力する。また、現在復号中のＶＯＰにＶＯＰヘッダが存在しない場合、ＶＰヘッダ内にヘッダ拡張コードＨＥＣにより重要情報が挿入されていれば、それを出力する。

復号化部３０３での復号化処理においては、重要情報構成部３０６で得た重要情報が用いられる。重要情報構成部３０６で得た重要情報には、復号化部３０３が現在復号中のＶＯＰ（ビデオ・オブジェクト・プレーン）にＶＯＰヘッダが存在している場合は、その情報を出力し、現在復号中のＶＯＰにＶＯＰヘッダが存在しない場合には、ＶＰヘッダ内にＨＥＣ（Header Extension Code）により重要情報が挿入されていれば、それを出力する。符号化処理側では、重要情報として通常の画像符号化における重要情報の他、任意形状画像符号化においては任意形状画像符号化における重要情報も含めるようにしてあるから、ヘッダが一部壊れていても、健全なヘッダを持つ部分については通常の画像を符号化したデータであっても、また、任意形状の画像を符号化したデータであっても、そのデータから画像を復号可能になる。また、同期コードがあるのでビデオ・パケットＶＰの同期外れの問題も解消する。すなわち、ビデオ・

パケットＶＰが同期外れを生じさせる誤りを有するとしても、ビデオパケットを含む同期コードＲＭで再同期をすることが可能である。

これらのことから、伝送時での雑音に対する耐性の高い、また、任意形状画像符号化の場合でも従来の長方形画像の符号化と同等の誤り耐性を持たせることができる動画像符号化技術の復号化技術を提供できる。

通常の画像符号化における重要情報の他、任意形状画像符号化においてはその任意形状画像符号化における重要情報もヘッダの情報として持たせて伝送することにより、伝送時での雑音に対する耐性を持たせる技術であり、受信側ではこの重要情報を如何にして抽出して復号化部３０３に渡し、復号化処理に利用できるようにするかが重要である。

従って、本実施例の特徴的な点は重要情報構成部３０６にある。そこで、重要情報構成部３０６について図６を用いて詳細に説明する。

重要情報構成部３０６は図６に示すように、通常画像関連重要情報構成部３０７、任意形状符号化判定部３０８、切替部３０９，３１１、任意形状画像関連重要情報構成部３１０とより構成される。

通常画像関連重要情報構成部３０７は、復号化部３０３においてＶＰヘッダが発見された場合に、そのＶＰヘッダの情報中から符号化モード情報、タイム・レファランス情報等を復号し、出力するように構成される。

任意形状符号化判定部３０８は、復号化部３０３が現在復

号処理している画像が任意形状画像か、または、従来からの長方形画像かを判定する部であって、その判定結果に応じて切替部３０９，３１１は切り替え制御される。切替部３０９，３１１は、２部の系統切り替えスイッチである。

任意形状画像関連重要情報構成部３１０は任意形状画像に関する重要情報（例えば、画像サイズ、画像位置等）を復号する部であり、任意形状画像の場合は切替部３０９，３１１が当該任意形状画像関連重要情報構成部３１０に接続されるように切り替えられ、任意形状画像に関する重要情報が再構成されて、通常画像関連重要情報構成部３０７による通常画像に関連する重要情報の他に任意形状画像に関する重要情報をも復号化部３０３に与えて、復号化部３０３での任意形状画像に関する復号化も可能にしている。

このような構成の重要情報構成部３０６においては、復号化部３０３において入力ビット列にＶＰヘッダが発見された場合は、まず通常画像関連重要情報構成部３０７が符号化モード情報、タイム・レファランス情報等を復号する。

また、任意形状符号化判定部３０８は復号化部３０３において現在復号処理されている画像が、任意形状画像かまたは従来からの長方形画像かを判定し、この判定結果に応じた制御信号を発生する。

任意形状符号化判定部３０８からの制御信号により切替部３０９，３１１は制御される。このとき、任意形状画像の場合は任意形状画像関連重要情報構成部３１０が任意形状画像に関する重要情報（例えば、画像サイズ、画像位置等）を復

Ｔは各１ビットである。

ここでは、例として３２ビットにアラインするために、最後にリザーブ“Reserve”のビット（ＲＶ）を挿入している。ＶＷ、ＶＨなどが連続することで同期コードなどのビット列と同じものが出現する可能性がある場合には、例えば、図１３のように、マーカ（Ｍ）を各値の間に挿入し、同期コードのような絶対に他に出てきてはならないビット列に一致しないようにすることも可能である。また、マーカＭの位置は、各情報の間である必要もなく、送信側／受信側で同一の規則になっていれば、どこに埋め込んでもかまわない。

最後に、拡張ヘッダがあることを示すフラグを通常のヘッダ情報の中に埋め込む必要がある。そこで、１ビットの情報で、通常ヘッダ内に拡張ヘッダが存在するかどうかの情報を埋め込むことになる。これらのフォーマットは例であり、この一部のデータだけでヘッダ情報を構成したり、これ以外の情報と組合せて用いることも可能である。

以上のようにして、本実施形態では、動画像を符号化してパケット化する場合に、通常画像関連重要情報を埋め込むパケットヘッダに拡張ヘッダを付加できるようにし、任意形状画像を符号化して送る場合に、その任意形状画像関連重要情報を拡張ヘッダに埋め込んでパケットヘッダとしてデータに付加し、パケット化するようにしている。従って、パケット毎に任意形状の画像を再生できるようになり、また、任意形状画像符号化の場合でも従来の長方形画像の符号化と同等の誤り耐性を持たせることができ、ＶＯＰヘッダや一部のＶＰ

請　求　の　範　囲

１．（補正後）入力された動画像を任意形状符号化した符号化情報をビット列として生成する符号化部と、

前記符号化部の符号化情報から、一定のビット列の纏まりがどのような規則のもとに符号化されているかを指し示す重要情報を取り出して構成する重要情報構成部と、

同期信号を発生する同期信号発生部と、

前記符号化部により符号化されたビット列に前記同期発生部から出力された同期信号と前記重要情報が二重化されているか否かを示すＨＥＣ符号と前記重要情報構成部により構成された重要情報を加えビット列を構成するビット列構成部と、

を具備した動画像符号化装置。

２．（補正後）前記重要情報構成部は、

前記符号化情報に基づき符号化画像が任意形状画像であるか否かを判定する任意形状符号化判定部と、

前記任意形状符号化判定部が任意形状画像と判定した場合に前記任意形状画像関連重要情報を出力する出力部と、

を備える、請求項１記載の動画像符号化装置。

３．（削除）

4．前記ビット列構成部は、前記重要情報を決められたフォーマットに二重化してヘッダに挿入する請求項1記載の動画像符号化装置。

5．（削除）

6．（削除）

7．（補正後）動画像を任意形状符号化して生成される符号化動画像情報および同期情報、並びに前記動画像を符号化するときに一定のビット列の纏まりがどのような規則のもとに符号化されているかを指し示す重要情報を含むヘッダ情報を有する符号化ビット列を受けるビット列受け入れ部と、

前記符号化ビット列から前記動画像情報に対応する画像ビット列を分離する分離部と、

前記画像ビット列を復号する復号化部と、

前記ビット列から同期信号を検出し前記復号化部へ通知する同期信号検出部と、

前記重要情報が二重化されていることを示すＨＥＣ符号を検出したとき、前記復号化部から出された前記ヘッダ情報から重要情報を構成し、復号化部に通知する重要情報構成部と、

を具備した動画像復号化装置。

８．（補正後）前記重要情報構成部は、

前記ヘッダ情報から復号化している画像が任意形状画像かどうかを判定する任意形状符号化判定部と、

前記ヘッダ情報から任意形状画像関連重要情報を構成する重要情報構成部と、

を具備した請求項７記載の動画像復号化装置。

９．前記重要情報構成部は、前記復号化部が復号中の前記ビット列にＶＯＰ（ビデオ・オブジェクト・プレーン）ヘッダが存在している場合は、ＶＯＰヘッダ情報を出力し、復号中の前記ビット列にＶＯＰヘッダが存在しない場合、ＶＰヘッダの前記重要情報を出力する請求項７記載の動画像復号化装置。

１０．（削除）

１１．（補正後）前記復号化部の復号情報から誤りが存在しないかどうかを判定するエラーチェック部と、前記エラーチェック部が誤りを検出したとき、前記同期検出部が検出した次の同期信号の位置から復号作業を行う請求項７記載の動画像復号化装置。

１６．（削除）

１７．（補正後）動画像を任意形状符号化し、符号化ビット列を生成する動画像符号化装置を含むサーバコンピュータと、

前記サーバコンピュータの符号化ビット列を送信する送信機と、

前記サーバコンピュータからの符号化ビット列を受信する受信機と、

前記受信機からの符号化ビット列を復号化する動画像復号化装置を含むクライアントコンピュータと、

を具備し、

前記動画像符号化装置は、

入力された動画像を任意形状符号化した符号化情報をビット列として生成する符号化部と、

前記符号化部の符号化情報から、一定のビット列の纏まりがどのような規則のもとに符号化されているかを指し示す重要情報を取り出して構成する重要情報構成部と、

同期信号を発生する同期信号発生部と、

前記符号化部により符号化されたビット列に前記同期発生部から出力された同期信号と前記重要情報が二重化されているか否かを示すＨＥＣ符号と前記重要情報構成部により構成された重要情報を加えビット列を構成するビット列構成部と、

で構成され、

前記動画像復号化装置は、

前記符号化ビット列から前記動画像情報に対応する画像ビット列を分離する分離部と、

前記画像ビット列を復号する復号化部と、

前記ビット列から同期信号を検出し前記復号化部へ通知する同期信号検出部と、

前記重要情報が二重化されていることを示すＨＥＣ符号を検出したとき、前記復号化部から出された前記ヘッダ情報か

ら重要情報を構成し、復号化部に通知する重要情報構成部と、
で構成される、
動画像伝送システム。

１８．（削除）

１９．符号化データ内で共通に扱われる情報を納めたヘッダと、

ＶＯＰヘッダとマクロブロックデータとを含む第１のビデオパケットと、ＶＰヘッダとマクロブロックデータとを含む少なくとも１つの第２のビデオパケットとからなるＶＯＰが記録された記録媒体において、

前記ＶＰヘッダは、同期信号と、任意形状符号化された符号化情報がどのような規則のもとに符号化されているかを指し示す重要情報が二重化されているか否かを示すＨＥＣ符号とを含むことを特徴とする記録媒体。

２０．前記ＶＰヘッダの重要情報は画像の幅、画像の高さ、画像を貼り込むＸ座標およびＹ座標、形状情報を縮小変換して符号化しているかどうかを示すフラグ、形状情報の符号化タイプの情報を含む請求項１９の記録媒体。

２１．（補正後）入力されたビット列から任意形状符号化された画像列を分離する分離手段と、

前記画像ビット列を復号する復号化手段と、

前記画像ビット列から同期信号を検出し、前記復号化手段へ通知する同期信号検出手段と、

前記任意形状符号化された画像列の再生に関わる重要情報が二重化されていることを示すＨＥＣ符号を検出したとき、前記復号化手段から出されたヘッダ情報から前記重要情報を構成し、復号化手段に通知する重要情報構成手段と、

を具備する動画像復号化装置。

２２.(補正後)前記ヘッダ情報から復号化している画像が任意形状画像かどうかを判定する任意形状符号化判定手段と、

ヘッダ情報から任意形状画像関連重要情報を構成する任意形状画像関連重要情報構成手段と、

前記任意形状符号化判定手段で任意形状画像だと判定された場合に前記任意形状画像関連重要情報を出力する手段と、

を具備する請求項２１の動画像復号化装置。

２３．（補正後）前記重要情報は、画像サイズ及び画像位置を示す情報を含む請求項１記載の動画像符号化装置。

２４．（補正後）前記重要情報は、画像サイズ及び画像位置を示す情報を含む請求項７記載の動画像復号化装置。

２５．（削除）

２６．（削除）

２７．（補正後）前記重要情報は、画像サイズ及び画像位置を示す情報を含む請求項１７記載の動画像伝送システム。

２８．（補正後）前記重要情報は、画像サイズ及び画像位置を示す情報を含む請求項２１記載の動画像伝送システム。

２９．（補正後）前記ＶＰヘッダは、重要情報が二重化されていることを示すＨＥＣ符号と、二重化された任意形状符号に関する重要情報とを含む請求項１９記載の記録媒体。

３０．（追加）前記重要情報は、画像の幅を示す１３ビット信号と、画像の高さを示す１３ビット信号と、画像を配置するＸ座標を示す１３ビット信号と、画像を配置するＹ座標を示す１３ビット信号と、形状情報を縮小変換して符号化しているかどうかを示す１ビット信号と、形状情報の符号化モードを示す１ビット信号をこの順序で配置して構成される請求項１記載の動画像符号化装置。

３１．（追加）前記重要情報は、画像の幅を示す１３ビット信号と、画像の高さを示す１３ビット信号と、画像を配置するＸ座標を示す１３ビット信号と、画像を配置するＹ座標を示す１３ビット信号と、形状情報を縮小変換して符号化しているかどうかを示す１ビット信号と、形状情報の符号化モードを示す１ビット信号をこの順序で配置して構成される請求

項７記載の動画像復号化装置。

３２.（追加）前記重要情報は、画像の幅を示す１３ビット信号と、画像の高さを示す１３ビット信号と、画像を配置するＸ座標を示す１３ビット信号と、画像を配置するＹ座標を示す１３ビット信号と、形状情報を縮小変換して符号化しているかどうかを示す１ビット信号と、形状情報の符号化モードを示す１ビット信号をこの順序で配置して構成される請求項１７記載の動画像伝送システム。

３３.（追加）前記重要情報は、画像の幅を示す１３ビット信号と、画像の高さを示す１３ビット信号と、画像を配置するＸ座標を示す１３ビット信号と、画像を配置するＹ座標を示す１３ビット信号と、形状情報を縮小変換して符号化しているかどうかを示す１ビット信号と、形状情報の符号化モードを示す１ビット信号をこの順序で配置して構成される請求項１９記載の記録媒体。

３４.（追加）前記重要情報は、画像の幅を示す１３ビット信号と、画像の高さを示す１３ビット信号と、画像を配置するＸ座標を示す１３ビット信号と、画像を配置するＹ座標を示す１３ビット信号と、形状情報を縮小変換して符号化しているかどうかを示す１ビット信号と、形状情報の符号化モードを示す１ビット信号をこの順序で配置して構成される請求項２１記載の動画像復号化装置。

３５.（追加）入力された動画像を任意形状符号化した符号化情報をビット列として生成するステップと、

前記符号化情報から、一定のビット列の纏まりがどのよう

な規則のもとに符号化されているかを指し示す重要情報を取り出すステップと、

同期信号を生成するステップと、

符号化されたビット列に前記同期信号と前記重要情報が二重化されているか否かを示すＨＥＣ符号と前記重要情報を加えビット列を構成するステップと、

を具備した動画像符号化方法。

３６.（追加）前記ビット列構成ステップは、前記重要情報を決められたフォーマットに二重化してヘッダに挿入する請求項３５記載の動画像符号化方法。

３７.（追加）前記重要情報は、画像サイズ及び画像位置を示す情報を含む請求項３５記載の動画像符号化方法。

３８.（追加）前記重要情報は、画像の幅を示す１３ビット信号と、画像の高さを示す１３ビット信号と、画像を配置するＸ座標を示す１３ビット信号と、画像を配置するＹ座標を示す１３ビット信号と、形状情報を縮小変換して符号化しているかどうかを示す１ビット信号と、形状情報の符号化モードを示す１ビット信号をこの順序で配置して構成される請求項３５記載の動画像符号化方法。

３９.（追加）動画像を任意形状符号化して生成される符号化動画像情報および同期情報、並びに前記動画像を符号化するときに一定のビット列の纏まりがどのような規則のもとに符号化されているかを指し示す重要情報を含むヘッダ情報を有する符号化ビット列を受けるステップと、

前記符号化ビット列から前記動画像情報に対応する画像ビ

ット列を分離するステップと、

前記画像ビット列を復号するステップと、

前記ビット列から同期信号を検出し前記復号化部へ通知するステップと、

前記重要情報が二重化されていることを示すＨＥＣ符号を検出したとき、前記ヘッダ情報から重要情報を構成するステップと、

を具備した動画像復号化方法。

４０．（追加）前記重要情報構成ステップは、復号中の前記ビット列にＶＯＰ（ビデオ・オブジェクト・プレーン）ヘッダが存在している場合は、ＶＯＰヘッダ情報を出力し、復号中の前記ビット列にＶＯＰヘッダが存在しない場合、ＶＰヘッダの前記重要情報を出力する請求項３９記載の動画像復号化方法。

４１．（追加）前記重要情報は、画像サイズ及び画像位置を示す情報を含む請求項３９記載の動画像復号化方法。

４２．（追加）前記重要情報は、画像の幅を示す１３ビット信号と、画像の高さを示す１３ビット信号と、画像を配置するＸ座標を示す１３ビット信号と、画像を配置するＹ座標を示す１３ビット信号と、形状情報を縮小変換して符号化しているかどうかを示す１ビット信号と、形状情報の符号化モードを示す１ビット信号をこの順序で配置して構成される請求項３９記載の動画像復号化方法。

４３．（追加）サーバコンピュータにおいて動画像を任意形状符号化し、符号化ビット列を生成する動画像符号化ステッ

プステップと、

前記サーバコンピュータから前記符号化ビット列を送信するステップと、

前記サーバコンピュータからの符号化ビット列を受信するステップと、

クライアントコンピュータにおいて前記受信した符号化ビット列を復号化するステップと、

を具備し、

前記動画像符号化ステップは、

入力された動画像を任意形状符号化した符号化情報をビット列として生成するステップと、

前記符号化ステップで生成される符号化情報から、一定のビット列の纏まりがどのような規則のもとに符号化されているかを指し示す重要情報を取り出すステップと、

同期信号を発生するステップと、

前記符号化されたビット列に前記同期信号と前記重要情報が二重化されているか否かを示すＨＥＣ符号と前記重要情報を加えビット列を構成するステップと、

で構成され、

前記復号化ステップは、

前記符号化ビット列から前記動画像情報に対応する画像ビット列を分離するステップと、

前記画像ビット列を復号するステップと、

前記ビット列から同期信号を検出するステップと、

前記重要情報が二重化されていることを示すＨＥＣ符号を

検出したとき、前記ヘッダ情報から重要情報を生成するステップと、

で構成される、

動画像伝送方法。

４４．（追加）前記重要情報は、画像サイズ及び画像位置を示す情報を含む請求項４３記載の動画像伝送方法。

４５．（追加）前記重要情報は、画像の幅を示す１３ビット信号と、画像の高さを示す１３ビット信号と、画像を配置するＸ座標を示す１３ビット信号と、画像を配置するＹ座標を示す１３ビット信号と、形状情報を縮小変換して符号化しているかどうかを示す１ビット信号と、形状情報の符号化モードを示す１ビット信号をこの順序で配置して構成される請求項４３記載の動画像伝送方法。

４６．（追加）入力されたビット列から任意形状符号化された画像列を分離するステップと、

前記画像ビット列を復号するステップと、

前記画像ビット列から同期信号を検出するステップと、

前記任意形状符号化された画像列の再生に関わる重要情報が二重化されていることを示すＨＥＣ符号を検出したとき、前記ヘッダ情報から前記重要情報を生成するステップと、

を具備する動画像復号化方法。

４７．（追加）前記重要情報は、画像の幅を示す１３ビット信号と、画像の高さを示す１３ビット信号と、画像を配置するＸ座標を示す１３ビット信号と、画像を配置するＹ座標を示す１３ビット信号と、形状情報を縮小変換して符号化して

いるかどうかを示す１ビット信号と、形状情報の符号化モードを示す１ビット信号をこの順序で配置して構成される請求項４６記載の動画像復号化方法。

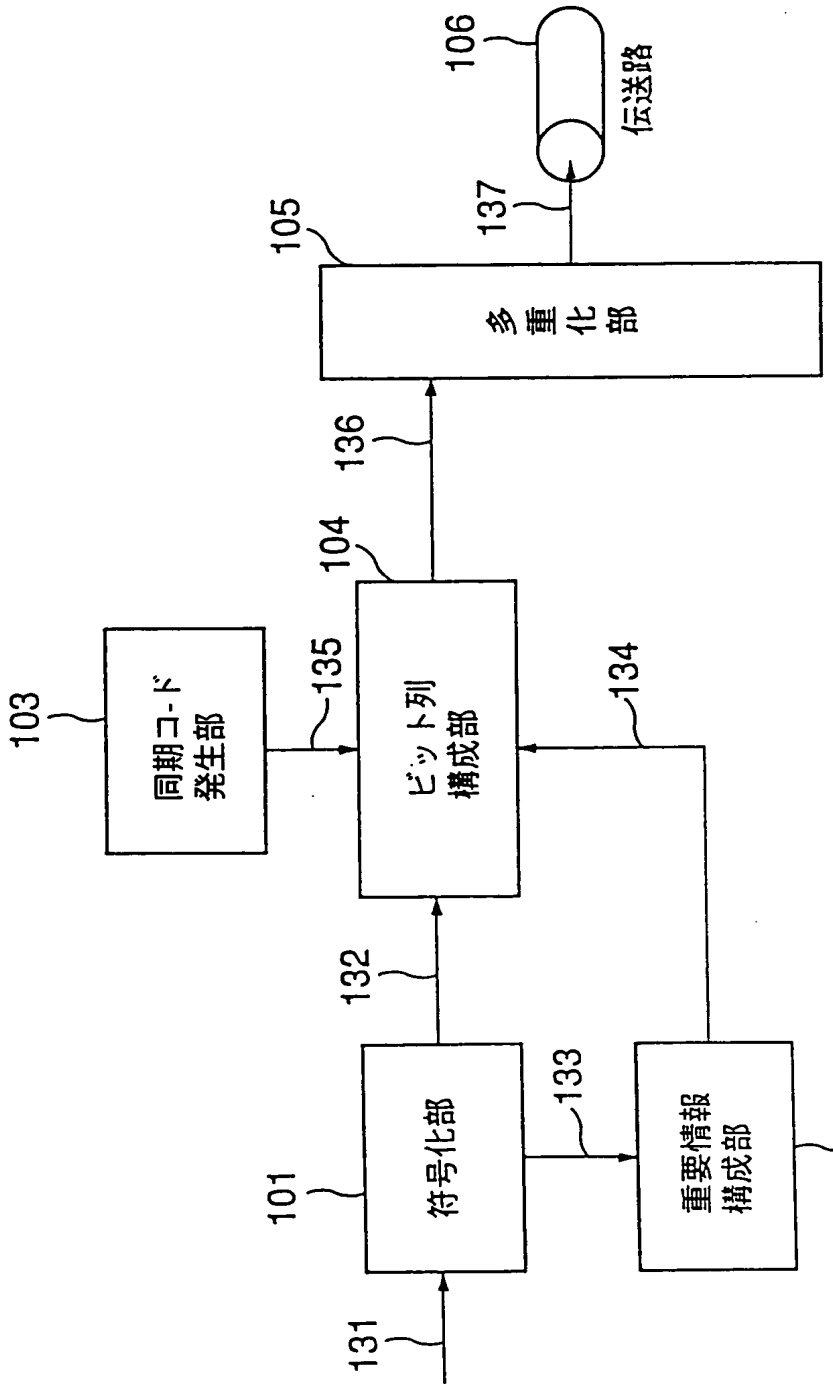
106
伝送路
137
105
多重化部
136
104
ビット列構成部
103
同期コード発生部
135
134
132
符号化部
101
133
重要情報構成部
102
131

FIG. 1

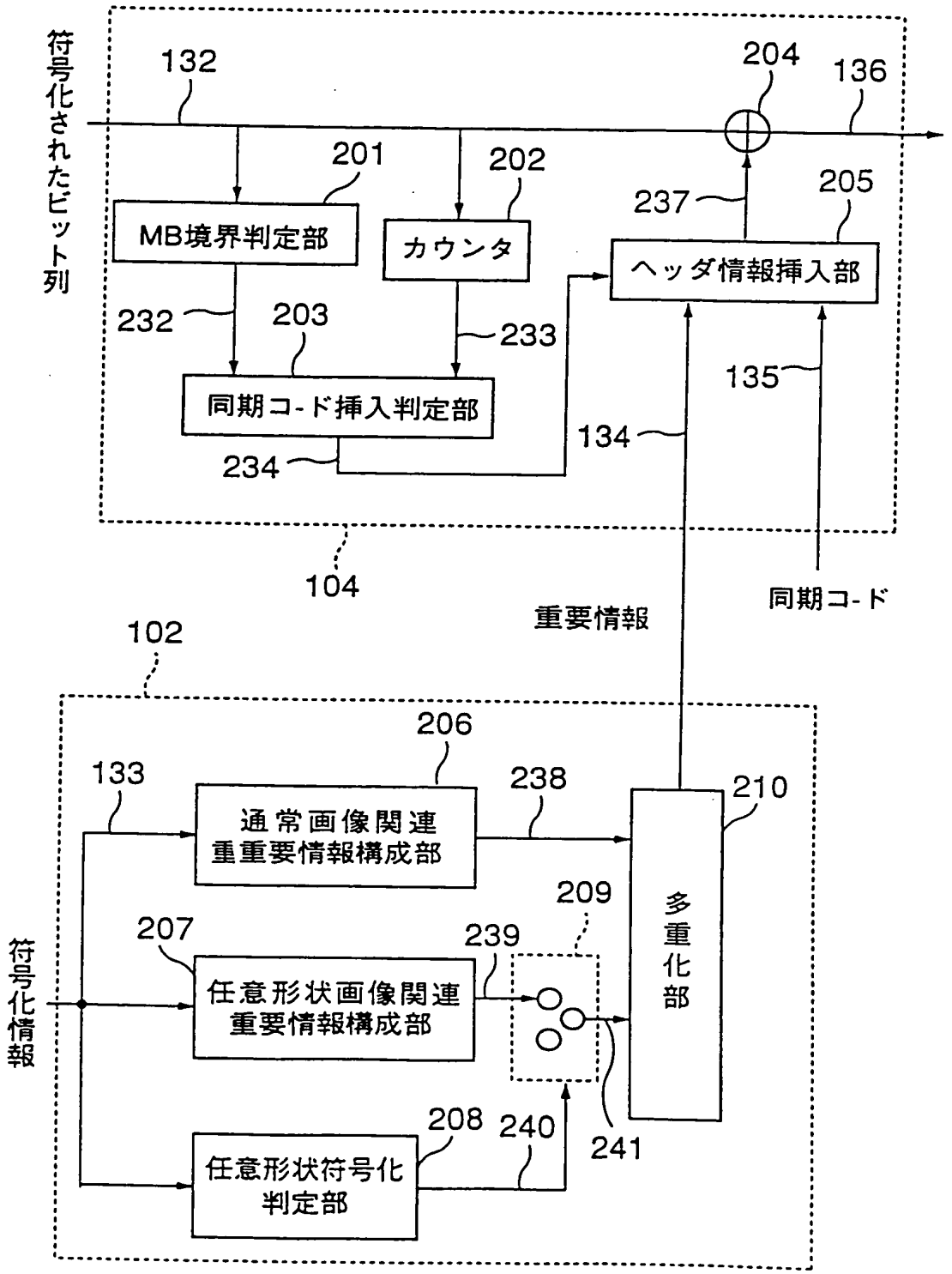
符号化されたビット列
132
204
136
201
202
237
205
MB境界判定部
カウンタ
ヘッダ情報挿入部
232
203
233
135
同期コ-ド挿入判定部
134
234
104
同期コ-ド
重要情報
102
206
133
238
210
通常画像関連重重要情報構成部
209
207
239
多重化部
符号化情報
任意形状画像関連重要情報構成部
208
240
241
任意形状符号化判定部

FIG. 2

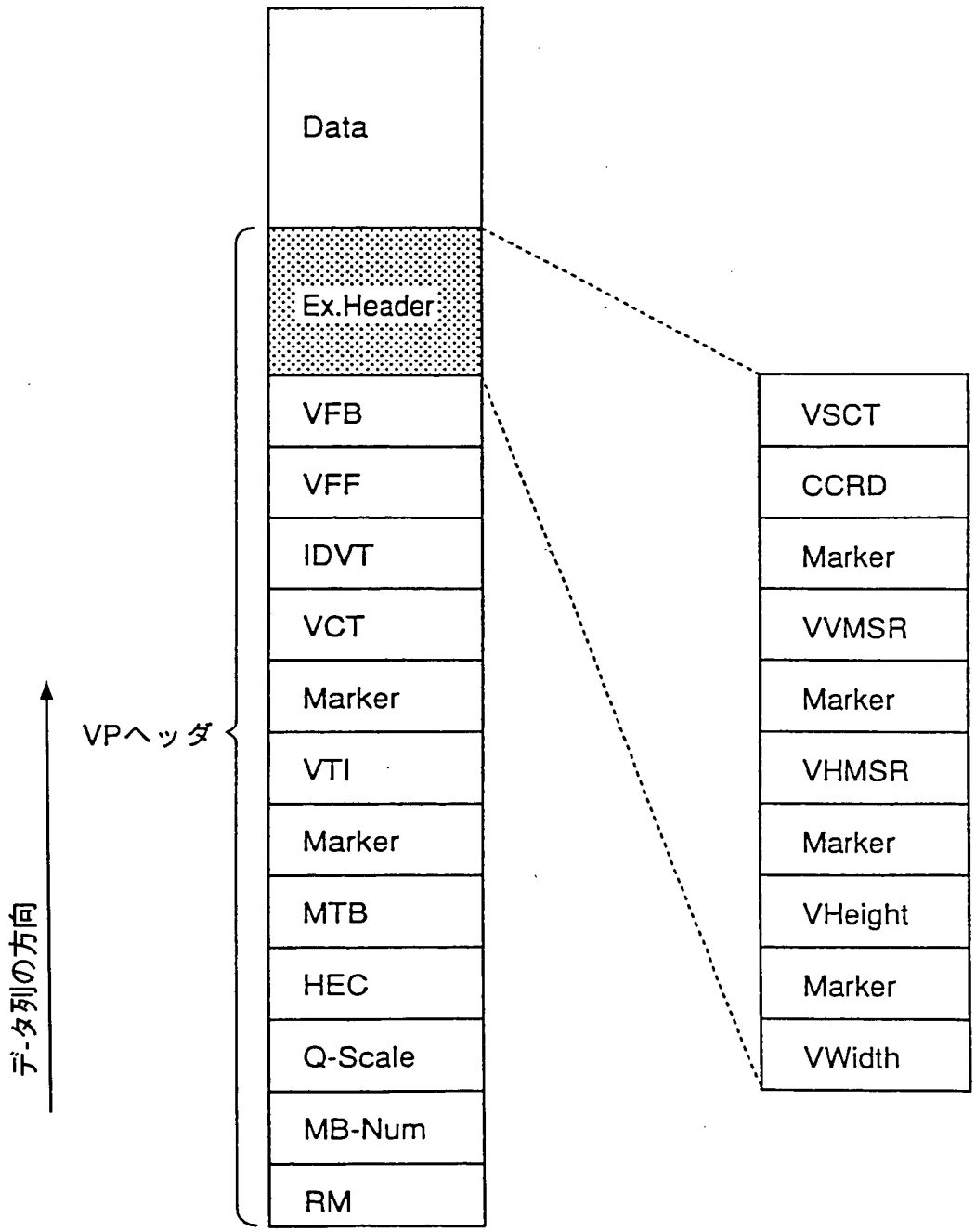
Data
Ex.Header
VFB
VFF
IDVT
VCT
Marker
VTI
Marker
MTB
HEC
Q-Scale
MB-Num
RM
VPヘッダ
データ列の方向
VSCT
CCRD
Marker
VVMSR
Marker
VHMSR
Marker
VHeight
Marker
VWidth

FIG. 4

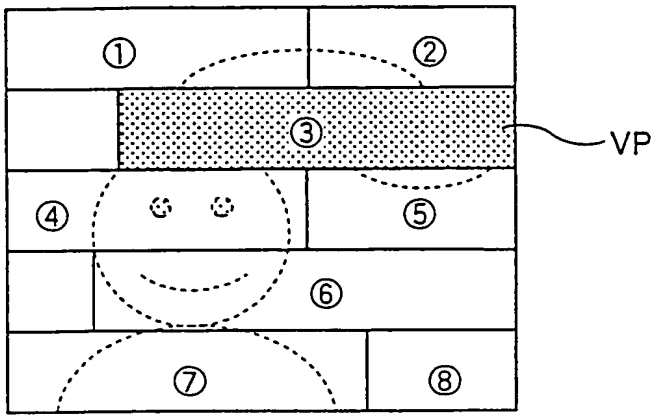
①
②
③
VP
④
⑤
⑥
⑦
⑧

FIG. 19

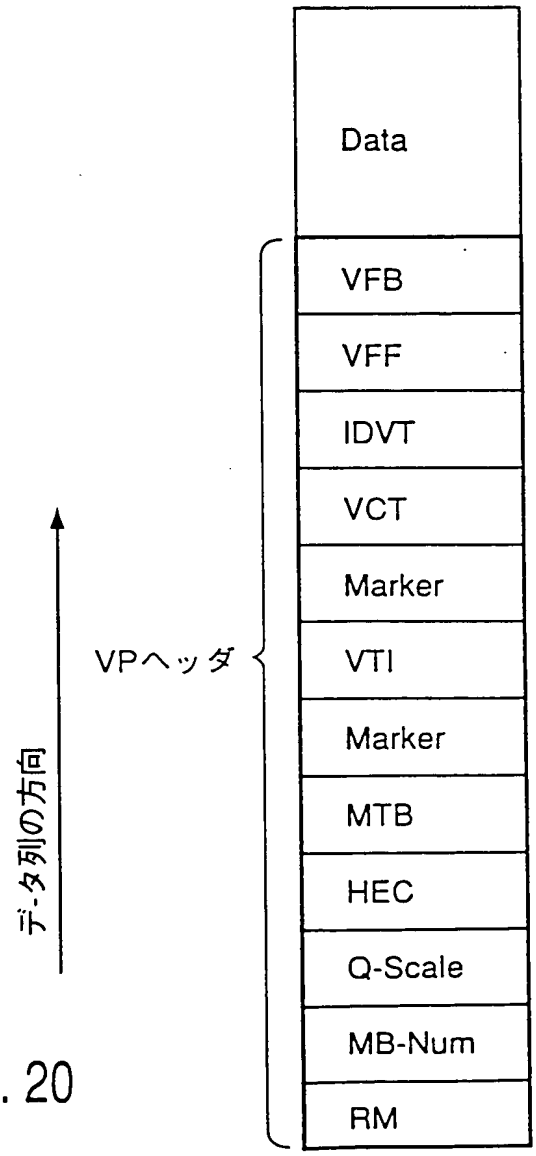
Data
VFB
VFF
IDVT
VCT
Marker
VTI
Marker
MTB
HEC
Q-Scale
MB-Num
RM
VPヘッダ
データ列の方向

FIG. 20

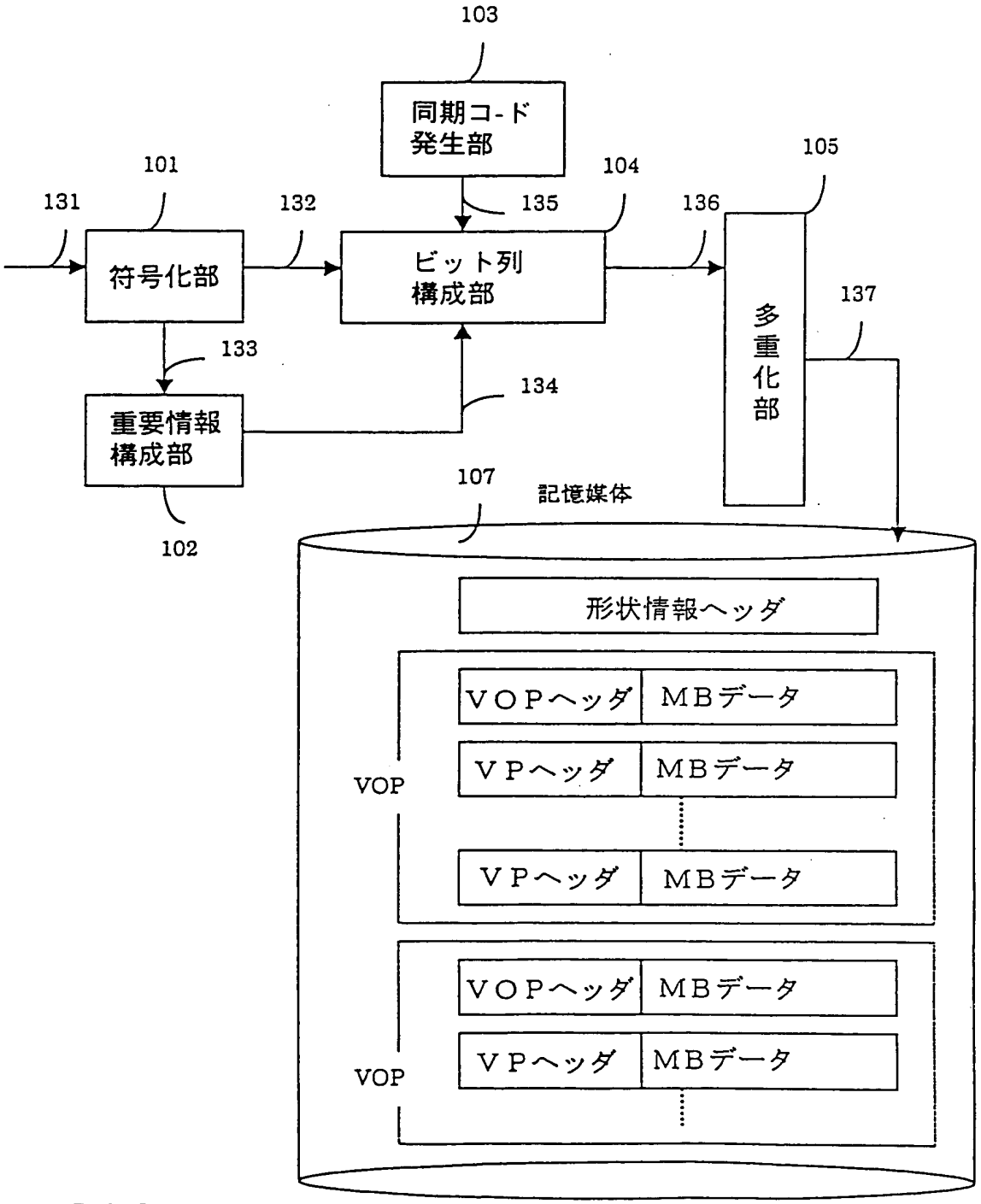
103
同期コード
発生部
101
104
105
131
132
135
136
符号化部
ビット列
構成部
多
重
化
部
137
133
134
重要情報
構成部
107
記憶媒体
102
形状情報ヘッダ
VOPヘッダ
MBデータ
VOP
VPヘッダ
MBデータ
VPヘッダ
MBデータ
VOPヘッダ
MBデータ
VOP
VPヘッダ
MBデータ

FIG. 26